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\*\*\*Helium-3 Bad\*\*\*

He-3 Bad- Timeframe

The timeline was and is 50 years—not feasible

Williams 7 (Mark, MIT Tech Review, “Mining The Moon” http://www.technologyreview.com/printer\_friendly\_article.aspx?id=19296 8/23 JF)

Could He3 from the moon truly be a feasible solution to our power needs on Earth? Practical nuclear fusion is nowadays projected to be five decades off--the same prediction that was made at the 1958 Atoms for Peace conference in Brussels. If fusion power's arrival date has remained constantly 50 years away since 1958, why would helium-3 suddenly make fusion power more feasible? Still, Kulcinski's reactor proves only the theoretical feasibility and advantages of He3-He3 fusion, with commercial viability lying decades in the future. "Currently," he says, "the Department of Energy will tell us, 'We'll make fusion work. But you're never going to go back to the moon, and that's the only way you'll get massive amounts of helium-3. So forget it.' Meanwhile, the NASA folks tell us, 'We can get the helium-3. But you'll never get fusion to work.' So DOE doesn't think NASA can do its job, NASA doesn't think that DOE can do its job, and we're in between trying to get the two to work together." Right now, Kulcinski's funding comes from two wealthy individuals who are, he says, only interested in the research and without expectation of financial profit. Overall, then, helium-3 is not the low-hanging fruit among potential fuels to create practical fusion power, and it's one that we will have to reach the moon to pluck. That said, if pure He3-based fusion power is realizable, it would have immense advantages.

Practical use of Helium-3 is decades away—too much doubt

AP 4 (Associated Press, “What the moon has to offer” http://www.msnbc.msn.com/id/3967790/ns/technology\_and\_science-space/t/what-moon-has-offer/ 1/15 JF)

There’s so little helium-3 on Earth that the technology hasn’t been studied much, but the moon appears to have it in abundance, he said. That’s because the moon lacks the atmosphere and magnetic field that keep helium-3 from raining down on our planet from outer space. The downside is that scientists haven't yet figured out how to build a safe, energy-producing fusion reactor. The ITER project, which draws its acronym from the old title "International Thermonuclear Experimental Reactor," is aimed at conducting fusion research, but scientists say commercial applications are decades away. Even then, it's not clear whether helium-3, mined on the moon and shipped back to Earth, will be the least expensive option for fueling such reactors.

Viable helium-3 fusion is thirty years away

Hedman 6 (Eric, CTO of Logic Corporation, “A Fascinating Hour With Gerald Kulcinski” http://www.thespacereview.com/article/536/1 1/16 JF)

It wasn’t long after the development of the atom bomb that development work on thermonuclear weapons—the hydrogen bomb—was started. Physicists already knew that fusion as a power source was theoretically possible. It wasn’t until the seventies, though, that scientists started trying to develop the technology to do it. A roadmap was laid out to try to get it to work. Thirty years later we’re still thirty years away from commercially-viable fusion reactors based on current development plans.

He-3 Bad – Solvency – Mining

The moon’s gravity complicates equipment and extraction

The Engineer 9 (technology and innovation magazine, “Mining The Moon”http://innovation-nation.ca/pdf/Mining-the-moon\_In-depth\_The-Engineer.pdf 4/24 JF)

And despite some analogies with mining on the earth, Baiden warned that the low gravity on the Moon— one-sixth of that on earth — will present some severe engineering challenges. ’A lot of the density separation techniques used on earth rely on gravity and would have to be rethought,’ he added. ’Low gravity would also have a bearing on the size and scale of mining equipment. For instance, drilling on earth is almost always a function of gravity: for example, you need a machine that weighs a few tonnes to get the force you need to drill a hole, then if you move to the Moon, the mass you need goes up by six times, which means the weight goes up by six times and the cost to get it there goes up.’

Extracting useful helium-3 would require extreme amounts of mining

The Engineer 9 (technology and innovation magazine, “Mining The Moon”http://innovation-nation.ca/pdf/Mining-the-moon\_In-depth\_The-Engineer.pdf 4/24 JF)

Another lunar resource that is often spoken about is Helium 3 (He-3), anon-radioactive isotope of helium that some have suggested could even be mined on the Moon and brought back to Earth to power future fusion reactors. Crawford is sceptical. ’We know He-3 is present in the lunar regolith because it has been extracted from the Apollo samples, but it is present in the Apollo samples in such small amounts— of the order of 10 parts per billion —that the amount you would need to make a significant difference for nuclear energy production on earth would mean strip mining thousands of square kilometres of lunar surface.’ But He-3 could have potential for powering future spacecraft propulsion systems. ’In the context of future space nuclear power systems where you’d require much more modest quantities, then, assuming a He-3 reactor is ever made to work, He-3 might be less unrealistic.

Lunar mining is impossible – moon distance, mining is difficult, power requirements are monumental, & the mining mostly produces helium-4

Packard 11 (Steve, Scientist, 5-10, http://depletedcranium.com/once-again-helium-3-from-the-moon-is-not-going-to-solve-our-energy-problems/, accessed 7-8, JG)

The Apollo Program used the Saturn-V to launch a manned capsule to the moon. This is the largest rocket ever built and each one was only good for sending a single mission and a single lander to the moons surface. Each Apollo Lunar Module could only carry a maximum payload of a few hundred kilograms. Perhaps if the craft were unmanned and thus did not need to have life support systems or a crew on board, more could be brought back. None the less, it would still require a massive expenditure and enormous rocket power to get even a ton of material back from the moon. But there’s another problem. Helium-3 is not just sitting in a compressed gas tank on the moon, waiting to be taken back. It’s embedded in the rocks and soil on the surface of the moon. The actual amount of helium-3 in a given quality of rock is miniscule, so bringing the rock back to earth to process out the He-3 is not an option. Instead, huge volumes of rock and soil would need to be collected on the moon and brought to some kind of moon-based extraction facility. This would be an enormous mining operation, requiring many robotic excavators and movers and a large system to extract the helium-3. Not only that, but it would need to be powered somehow, requiring its own nuclear reactors or massive solar power systems. Presumably each piece of equipment would require its own massive rocket to reach the moon. Once the moon rock is collected, it would have to be pulverized and heated to outgas the helium from the rock. Unfortunately, doing this will not result in only helium being collected. Rather the moon rock will produce a mixture of nitrogen, oxygen, water vapor and other gases from which the helium must be chemically separated. This would not be a huge difficulty, since helium is an inert gas, but it is being done on the moon, so all the equipment, once again, has to be launched on massive rockets. But there’s yet another huge problem. The helium which is extracted from lunar material contains at least 30 times more helium-4 (regular helium) than it does helium-3. Helium-4 is nowhere near valuable enough to make it worth going to the moon to get. This leaves two choices: Either bring back the extracted helium and accept the fact that more than 95% of the payload is going to be wasted on helium-4 or separate the helium-3 from the helium-4 on the moon. Isotopic separation is one of the most complex and energy intensive industrial processes in existence. It requires massive cascades of centrifuges or gaseous diffusion membranes where gas is pumped at high pressure and isotopic concentrations are increased slightly in a process that must be repeated hundreds or thousands of times. The mass difference between helium-3 and helium-4 and the fact that it’s already a gas would make the process slightly simpler than enriching something like uranium, but it would still require that a huge and complex operation be mounted on the moon! Yes, we’re talking about an enormous industrial facility, typically requiring at least hundreds of workers, hundreds of tons of specialized equipment and many megawatts of power on the moon.

He-3 Bad – Solvency – Fusion

Helium-3 fusion is impossible on Earth – heating must be hotter than the Sun

Williams 7(Mark, Technology Review by MIT, “M8-23, http://www.technologyreview.com/printer\_friendly\_article.aspx?id=19296, accessed 7-6, JG)

Second, Close rejects the claim that two helium-3 nuclei could realistically be made to fuse with each other to produce deuterium, an alpha particle and energy. That reaction occurs even more slowly than deuterium-tritium fusion, and the fuel would have to be heated to impractically high temperatures--six times the heat of the sun's interior, by some calculations--that would be beyond the reach of any tokamak. Hence, Close concludes, "the lunar-helium-3 story is, to my mind, moonshine."

Don’t have the processing facilities – makes Helium-3 less attractive & less probable

Cheetham & Pastuf 8 (Brad & Dan, Aerospace @ Buffalo, 5-18, http://www.eng.buffalo.edu/~cheetham/index\_files/Moon%20Paper%20441.pdf, accessed 7-6, JG)

The possibility of a Helium-3 fueled lunar economy was mentioned previously. In order for this to be a possibility fusion technology must be advanced beyond the current very small scale reactions being achieved (Schmitt). One problem with this plan of waiting for fusion technology to develop before establishing a lunar base is that fusion without helium-3 is very much less attractive. Using common deuterium fusion plans, power plants would actually produce more nuclear waste per kilowatt hour than a nuclear fission plant of comparable size would (Schmitt 41). Thus fusion technology is somewhat dependent on having a large supply of He-3 while at the same time, getting He-3 from the Moon is depending on having large scale fusion plants operational.

H-3 doesn’t lead to a new fusion process – it produces the status quo fusion

Herald 8(Decan, 12-9, “Are we talking about moonshine?” pg, 3, accessed 7-6, JG)

At all the current fusion test reactor experiments such as the International Test Experimental Reactor (ITER) in France, the fusion fuel used is a mixture of deuterium and tritium (D and T) nuclei, which are iso-topes of hydrogen. Helium-3 is not used at all. Even the so-called hydrogen bomb (or thermonuclear device) uses no hydrogen, but only these heavier isotopes, D and T. The D-T reaction is the most rapid of the reactions among the hydrogen iso-topes and can be triggered at even below hundred mil-lion degrees. However, this reaction produces a helium-4 nucleus (an alpha particle) and a high-energy neutron which carries the bulk of the reaction energy. This neutron makes the walls of the fusion tokamak reactor radioactive and so is as 'dirty' as conventional nu- clear fission reactors based on uranium or plutonium. The net result of bringing helium-3 all the way from the moon and burning it in a nuclear fusion reactor on earth is to effectively end up with the same old 11 T fusion process with its contaminating neutrons. Helium-3 enthusiasts claimed would be avoided and clean nuclear power would be provided! It has been suggested that two helium-3 nuclei can be fused to pro-duce D nucleus and energy. But on earth, this twin nuclear fusion would need a billion or two billion degrees. Even ITER cannot generate energy from D•T. It is only by 2030 that one can hope for a commercial reactor based on only D-T. For now, transporting bulk quantities of helium-3 and solving power generation problems on earth is just moonshine. Much like what Rutherford famously re-marked. 'Anyone who expects a source of power from the transformation of the atom," he famously declared, "is talking moonshine."

He-3 Bad – Solvency – Fusion

Fusian reactors aren’t even invented yet – & they might not ever exist

Packard 11 (Steve, Scientist, 5-10, http://depletedcranium.com/once-again-helium-3-from-the-moon-is-not-going-to-solve-our-energy-problems/, accessed 7-8, JG)

Let me repeat this because it is by far the most important deal breaker on this whole issue: nuclear fusion for the purpose of energy generation does not exist. The only way we can produce fusion energy that is greater than the energy necessary to initiate and contain the fusion is with an H-bomb. Fusion can also be produced in the laboratory, but it always uses more energy than it produces. Also, producing more than a relatively small amount of nuclear fusion requires extremely complex and costly equipment. Since fusion reactions do produce energy, it is possible, at least in theory, that fusion could be used as an energy source IF the technical challenges could be overcome. To this end, a great deal of research is being conducted just as it has been for decades. Will fusion power ever become a reality? Maybe. Then again, maybe not. It’s possible that tomorrow a researcher will stumble across a novel way of producing nuclear fusion cheaply and simply while generating huge amounts of energy. I wouldn’t bank on it though. There are several methods of producing fusion which are being investigated as potential energy sources. The one that has received the most effort is magnetic confinement fusion using the tokomak design. Some tokomaks have approached “break even” energy balances for short periods of time. An ambitious project is currently under way known as the International Thermonuclear Experimental Reactor. It is expected to begin operation in 2018 with the ambitious goal of producing more energy than is consumer for periods of several minutes. Of course, a project like ITER is not going to represent any kind of major power source. In order for that to happen, fusion power systems will need to operate reliably for extended periods of time. Not only that, but they will need to be economical enough to be built by the hundreds or thousands. If the current path of fusion research is followed, we have no chance of seeing effective fusion power generation for at least many decades, if ever.

Helium 3 reactions emit neutron streams which make containment impossible

Technology Review 7 (Published by MIT, 8-23, <http://www.technologyreview.com/Energy/19296/>, 7-6-11, SRF)

Advocates of He3-based fusion point to the fact that current efforts to develop fusion-based power generation, like the ITER megaproject, use the deuterium-tritium fuel cycle, which is problematical. (See "International Fusion Research.") Deuterium and tritium are both hydrogen isotopes, and when they're fused in a superheated plasma, two nuclei come together to create a helium nucleus--consisting of two protons and two neutrons--and a high-energy neutron. A deuterium-tritium fusion reaction releases 80 percent of its energy in a stream of high-energy neutrons, which are highly destructive for anything they hit, including a reactor's containment vessel. Since tritium is highly radioactive, that makes containment a big problem as structures weaken and need to be replaced. Thus, whatever materials are used in a deuterium-tritium fusion power plant will have to endure serious punishment. And if that's achievable, when that fusion reactor is eventually decommissioned, there will still be a lot of radioactive waste.

He-3 Bad – Solvency – Fusion

No point in getting Helium-3 now—no practical fusion for at least 10 years and 40 years until a power plant

Campbell et al 9 (Michael, Henry M. Wise, Joseph Evensen, Bruce Handley, Stephen Testa, James Conca, Hal Moore; members of the AAPG Energy Minerals Division Uranium Committee, “The Role of Nuclear Power in Space Exploration and the Associated Environmental Issues: An Overview” Pg. 21-22 6/9 JF)

The IAEA report ( 2005a) indicates that personnel from both China and the Russian Federation have reported that the lunar regolith could be mined for 3 He for use in nuclear fusion power plants on Earth in a few decades . They claim that the use of 3He would perhaps make nuclear fusion conditions much easier to attain, removing one of the major obstacles to obtaining fusion conditions in plasma containment reactors for power production on Earth. Schmitt (2006) treats the subject in great detail, from mining on the Moon to energy production (see Livo, 2006 for review of text). However, Wiley (2008), a 37-year veteran of fusion research and a former senior physicist (retired) at the Fusion Research Center of the University of Texas at Austin, indicates that the higher the temperatures produced in the containment vessel, the more radiation losses occur. Also, confinement problems have yet to be solved and he doesn't expect the problems to be resolved for m any decades. This is based on the fact that the simplest reaction, Deuterium - Tritium (D- T), is going to require m any more years to harness. Wiley indicated that the agreement on ITER was signed less than two years ago and they are already having problems with both the design and budget (see Anon, 2008c). It will be at least ten years, and probably much longer, before encouraging results emerge from work at the ITER facility in France. He suggested that the ITER plans do not include a demonstration reactor. Add another 20 years to build a demonstration reactor and then another 20 years to build a single power plant. Wiley also indicated that the standard fusion argument is that even if there were reserves of Deuterium in sea water to fuel an operation for 1,000 years - the Tritium has to be retrieved from a breeder reactor, which has not yet been constructed. So, even if 3He is readily available, what real value is the resource until the physics problems have been solved and the plants are built to use D-T or 3He?

Even if we get Helium-3, the fusion process is impractical and useless

Weinberger 7 (Sharon, Danger Room national security news, “Moon Mining: Just a Fantasy?” http://www.wired.com/dangerroom/2007/08/moon-mining-jus/ 8/28 JF)

Lunar enthusiasts have advocated mining helium-3on the moon as a potential source of energy. How realistic is this? According to an interesting article in Technology Review, these lunar plans may not be loony, but perhaps a bit unrealistic. In the August issue of Physics World, theoretical physicist Frank Close, at Oxford in the UK, has published an article called "Fears Over Factoids" in which, among other things, he summarizes some claims of the "helium aficionados," then dismisses those claims as essentially fantasy. Close points out that in a tokamak–a machine that generates a doughnut-shaped magnetic field to confine the superheated plasmas necessary for fusion–deuterium reacts up to 100 times more slowly with helium-3 than it does with tritium. In a plasma contained in a tokamak, Close stresses, all the nuclei in the fuel get mixed together, so what’s most probable is that two deuterium nuclei will rapidly fuse and produce a tritium nucleus and proton. That tritium, in turn, will likely fuse with deuterium and finally yield one helium-4 atom and a neutron. In short, Close says, if helium-3 is mined from the moon and brought to Earth, in a standard tokamak the final result will still be deuterium-tritium fusion. Second, Close rejects the claim that two helium-3 nuclei could realistically be made to fuse with each other to produce deuterium, an alpha particle and energy. That reaction occurs even more slowly than deuterium-tritium fusion, and the fuel would have to be heated to impractically high temperatures–six times the heat of the sun’s interior, by some calculations–that would be beyond the reach of any tokamak. Hence, Close concludes, "the lunar-helium-3 story is, to my mind, moonshine."

No breakeven on fusion energy in the squo

**D’Souza, Otalvaro, and Singh 6**(Marsha, Diana, and Deep, Worcester Polytechnic Institute “Harvesting Helium-3 From The Moon” p. 99 2/17 JF)

When I talk about investment and effort I don’t only mean in my project, but rather the global perspective. There are $2 billion invested world wide, only a fraction of which are devoted to substantial research. Major obstacles in fusion plant design are associated with the difficulty of obtaining breakeven energy levels. No one has been able to demonstrate break even. Not even Europe, where there is a huge, 10-20 billion, initiative to develop a steady deuterium-tritium reactor. However, the problem of the deuterium-tritium reactor is the radioactive waste produced and the issue of tritium confinement, both of which represent monumental obstacles in themselves.

He-3 Bad – Solvency – No Advantage

No reason to prefer Helium-3 – it doesn’t provide as much fuel as its alternatives

Packard 11 (Steve, Scientist, 5-10, http://depletedcranium.com/once-again-helium-3-from-the-moon-is-not-going-to-solve-our-energy-problems/, accessed 7-8, JG)

Most fusion research has focused on deuterium and/or tritium (heavy isotopes of hydrogen) as fuel for generating fusion. The lowest energy (and thus easiest) fusion reaction to produce uses deuterium fusing with tritium. Deuterium on deuterium fusion is another option, which requires slightly more energy and higher temperatures. Other research has considered the use of boron as a fusion fuel. Deuterium is found in abundance in all water on earth. Tritium is not found in nature but can be produced by the neutron bombardment of lithium. Boron is also easily obtained. The only advantage of using helium-3as fuel (if you can call it that), rather than deuterium and tritium is that it does not produce neutrons when it is used in combination with deuterium. In practice any fusion reactor powered by helium-3 and deuterium will produce some neutrons because deuterium atoms will also fuse with other deuterium atoms. So to be more accurate, a helium-3 fusion reactor would produce less neutron radiation than one fueled by deuterium alone or deuterium and tritium. The reason that this is sometimes considered to be an advantage is that neutron irradiation tends to leave materials radioactive and degrades most materials that would be used to construct a reactor. Consequently, the housing of a fusion reactor would have to be replaced periodically after a certain number of years. The old housing would be slightly radioactive and considered low-level or medium-level waste. For those who consider all radioactive material evil this is a big problem. However, the lack of neutron production can also be a disadvantage. The neutrons produced by a fusion reactor could be used to generate more fuel in the form of tritium by surrounding the fusion reactor with lithium. They also provide a way of harvesting energy from the reaction. So a helium-3 based reactor would generate a bit less low-level waste and might need to have the housing replaced somewhat less frequently but would also not be capable of breeding more fuel. Oh, and did I mention this is all speculation since none of these exist anyway?

He-3 Bad – Solvency – Not On The Moon

Helium-3 not on the moon

Close 7 (Frank, Physics Prof. @Oxford, *Free Republic,* 8-3, <http://www.freerepublic.com/focus/f-news/1888121/posts>, 7-6-11, SRF)

Given that the amount of helium-3 available on Earth is trifling, it has been proposed that we should go to the Moon to mine the isotope, which is produced in the Sun and might be blown onto the lunar surface via the solar wind. Apart from not even knowing for certain if there isanyhelium-3 on the Moon, there are two main problems with this idea – one obvious and one intriguingly subtle. The first problem is that, in a tokomak, deuterium reacts up to 100 times more slowly with helium-3 than it does with tritium. This is because fusion has to overcome the electrical repulsion between the protons in the fuel, which is much higher for deuterium– helium-3reactions (the nuclei have one and two protons, respectively) than it is for deuterium– tritium reactions(one proton each). Clearly, deuterium–helium-3 is a poor fusion process, but the irony is much greater as I shall now reveal. A tokomak is not like a particle accelerator where counter-rotating beams of deuterium and helium-3 collide and fuse. Instead, all of the nuclei in the fuel mingle together, which means that two deuterium nuclei can rapidly fuse to give a tritium nucleus and proton. The tritium can now fuse with the deuterium– again much faster than the deuterium can with helium-3 – to yield helium-4 and a neutron. So by bringing helium-3 from the Moon, all we will end up doing is create a deuterium– tritium fusion machine, which is the very thing the helium aficionados wanted to avoid! Undeterred, some of these people even suggest that two helium-3 nuclei could be made to fuse with each other to produce deuterium, an alpha particle and energy. Unfortunately, this reaction occurs even more slowly than deuterium–tritium fusion and the fuel would have to be heated to impractically high temperatures that would be beyond the reach of a tokomak. And as not even the upcoming International Thermonuclear Experimental Reactor (ITER) will be able to generate electricity from the latter reaction, the lunar-helium-3 story – like the LHC as an Armageddon machine – is, to my mind, moonshine.

He-3 Bad – Solvency – Finite Resources

Even the Moon’s Helium-3 will run out – no long term solvency

Hatch 10 (Benjamin, Emory International, 10-22, http://www.iew.unibe.ch/unibe/rechtswissenschaft/dwr/iew/content/e3870/e3985/e4139/e6403/sel-topic\_4-hatch\_ger.pdf, accessed 7-9, JG)

While harvesting Helium-3 would obviously not destroy the Moon, it is important to note that even Moon rocks that contain Helium-3, or other resources, are not infinitely renewable. n186 The Moon is not expanding - it has a fixed mass, and, given sufficient time, the Moon could be harvested until even Helium-3 saturated Moon rocks become as rare as today's fossil fuels. In light of this reality, and despite the temporal distance until the point when lunar environmental harms become a bitter reality, environmental protections for the Moon are not only a wise decision but help to guarantee the Moon's presence as both a decoration in the night sky and a potential source of valuable minerals for future generations.

He-3 Bad – Dust – General

Lunar dust is easily disturbed—it disables machinery and poses health risks to humans

Miller and Coit 8 (Joseph and David, Worcester Polytechnic Institute, “Lunar Property and Mining Rights” May 26 Pg. 14-15 JF)

One of the first things that Neil Armstrong noted when first stepping off the Lunar Lander in 1969 was the surface of the moon. He made note of how fine the sediment of the surface was. The sediment, called regolith, is obviously the most prominent surface type currently on the moon, though there are outcroppings of rock and crater ridges. To mine for ferrous metals in the powder found on or near the surface one needs only to run a magnet along the surface and collect what sticks (Klinkman). The major hazard in working with the surface dust is that it is very dangerous to breath, can clog machinery and sticks to people in space suits. If there is any disturbance to the surface, such as a space craft landing, the particles of dust can be accelerated to incredible speeds and blown to the far reaches of the Moon. The blast of a liftoff may even drive some of the dust far enough to circle the moon before settling down again on the surface, due to the lack of air resistance and relatively modest pull of gravity. These fine particles can get into machinery and damage critical parts, disabling the machinery. The best way to remedy the problem of these flying particulates would be to pave the surface.

HE-3 Bad – Unsettles Dust

Lunar missions unsettle moon dust

Walton 7 (Otis, works at Grainflow Dynamics Inc., April, <http://gltrs.grc.nasa.gov/reports/2007/CR-2007-214685.pdf>, 7-9-11, SRF)

Lunar dust is a potential problem for planned robotic and manned lunar missions and future in-situ resource utilization (ISRU) operations. This paper reviews the physical characteristics of lunar dust and the effects of various fundamental forces acting on dust particles on surfaces in a lunar environment. In addition to mechanical forces (i.e., from rover wheels, astronaut boots, and rocket engine blast) static electric effects (from L'V photo-ionization and or triboelectric charging) are likely to be the major contributors to the motion of dust particles. If fine regolith particles are deposited on a surface, then surface energy related (e.g., van der Waals) adhesion forces, and static-electric-image forces are likely to be the strongest contributors to adhesion. Static-image forces at contact scale with the square of the particles' charge and inversely with the square of the particles' size (or the size of charge patches for nonuniform distributions of charge). The typical charge on particles coming from a lunar surface existing at a nearly uniform potential is expected to vary directly with the particle size. The image-charge force for such charged particles contacting a conductive surface would then depend primarily on the square of the particles' surface potential and be nearly independent of their size (e.g., the image-force would be constant, on the order of 0.05 nN/V2). On the other hand, electrically levitated dust particles may attain net charges (from UV photo-ionization and neutralization by capture of electrons iron: the plasma sheath) which depend on the square of the particle size. Depending on whether the typical electric charge on fine particles exposed to lunar conditions scales linearly in proportion to the particles' size (i.e., with particle-capacitance, and lunar surface potential) or with the square of the particle size, will determine whether static-image forces dominate over surface energy forces, or whether they are insignificant compared to surface energy forces, as the size of particles decreases to micron-scale and smaller. Considerable uncertainty also exists in estimates of the magnitude of surface-energy-related adhesive forces, because the lunar environment may allow effective surface energies to be significantly higher than are typically observed in a terrestrial laboratory atmosphere where adsorbed gas molecules can lower the effective surface energy. Also, the short-range nature of van der Waals forces makes them very sensitive to parameters such as the surface roughness of the particles (and the substrate) and the potential existence of ultra-fine particles adhering to larger dust particle surfaces. Typical centrifuge or AFM measurements of particle adhesion forces with nonideal particles and or surfaces (e.g., rough surfaces) are usually an order of magnitude or so less than theoretically predicted adhesion values. Suggestions for improvements in particle-scale numerical models (DEM) to make them capable of performing sensitivity studies of particle adhesion and removal are offered. Some of the dust removal methods presented at NASA's Dust Workshop (Golden, Colorado, May 2005) are also briefly described, with a note that the CO^-snow method (used for precision cleaning by the electronics industry) may offer a robust method of "gently" delivering particle-removal forces to micron-scale dust on surfaces in a lunar environment.

The plan’s repeated landings on the moon increase moon dust

Khan-Mayberry 7 (Noreen, NASA Space Toxicologist, <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20070006527_2007005296.pdf>, 7-8-11, SRF)

Unlike terrestrial dusts, which are largely the product of atmospheric and hydrodynamic modification lunar dusts {the <20 urn fraction of lunar soils) undergo "space weathering", which is a generic term used for a number of processes that act on any body exposed to the harsh space environment [2]. The lunar surface does not have Earth's protective atmosphere, exposing it directly to repeated hypervelocity meteorite impacts(Figure 1). These meteorites are of a wide size range and velocity. Hypervelocity impact results in the communition or fragmentation of the lunar surface rocks and to a lesser extent fusion and vaporization. Communition gradually reduces the particle size of the lunar dust. Communition is balanced by agglutination which results when small volumes of soil are melted in a micrometeorite impact and the melt incorporates nearby mineral fragments to form a larger particle called an "agglutinate." . Communition and agglutination are the two main dynamic processes involved in the textural evolution of lunar soils [3]. The texture of lunar soil evolves in a recurrent routine which is in direct response to continual reworking by the micrometeorite flux [4], The reworking of the lunar soil by successive hypervelocity impacts is referred to as "gardening" the soil, this continuous process causes turn over, mixing and soil aggregation. During lunar operations we can expect communition to occur during module landing, when large amounts of regolith are displaced and crushed. Gardening can also occur as crews excavate soils for research and other operational use, such as radiation shielding.

He-3 Bad – Dust – Destroys Equipment

Moon dust ruins key space equipment

Science Daily 8 (9-29, <http://www.sciencedaily.com/releases/2008/09/080924191552.htm>, 7-9-11, SRF)

These particles can wreak havoc on space suits and other equipment. During the Apollo 17 mission, for example, crewmembers Harrison “Jack” Schmitt and Gene Cernan had trouble moving their arms during moon walks because dust had gummed up the joints. “The dust was so abrasive that it actually wore through three layers of Kevlar-like material on Jack’s boot,” Taylor says. To make matters worse, lunar dust suffers from a terrible case of static cling. UV rays drive electrons out of lunar dust by day, while the solar wind bombards it with electrons by night. Cleaning the resulting charged particles with wet-wipes only makes them cling harder to camera lenses and helmet visors. Mian Abbas of the National Space Science and Technology Center in Huntsville, Alabama, will discuss electrostatic charging on the moon and how dust circulates in lunar skies.

Lunar dust destroys lunar equipment-radiator overheating and solar panel failure

Cheetham and Pastuf 8 (Brad and Dan, U Buffalo Dpt. Mechanical and Aerospace engineering, <http://www.eng.buffalo.edu/~cheetham/index_files/Moon%20Paper%20441.pdf>, 7-9-11, SRF)

Lunar dust poses a significant challenge to the development of a lunar base. During the Apollo missions dust caused multiple mechanical failures and health worries(Schmitt). The extremely abrasive dust particles can ruin seals, bearings, glass visors/windows, and more. Charging of these particles by both the solar wind and triboelectric charging from astronauts interacting with the dust compounds the problem. Charged particles can attach to radiators causing systems to overheat; they can levitate and fall on solar panels reducing electricity22 production, and cause many other problems. It has also been modeled that due to electrostatic forces very small particles may be propelled to heights of over 100km (Stubbs). This transport mechanism may even result in lunar dust storms as the terminator travels across the surface. These would be caused by differences in the electric potentials on areas exposed to the sun and areas not exposed to the sun. Understanding such phenomenon will be extremely important for a permanent base to be successful. Mitigation schemes will need to be developed and tested to deal with this dust problem for long term stays on the lunar surface.

Toxic dust sticks to lunar exploration equipment

Walton 7 (Otis, works at Grainflow Dynamics Inc., April, <http://gltrs.grc.nasa.gov/reports/2007/CR-2007-214685.pdf>, 7-9-11, SRF)

In addition to the "solar" sources of charging, regolith particles can attain charge through contact electrification (or tribocharging—transfer of charge from one body to another as they touch and come apart). Tribocharging involves the transfer of charge (electrons) from one surface to another in the vicinity of contact. There is little tendency for a statistically-significant net transfer of charge when like-surfaces separate; however, when unlike-surfaces separate a net transfer of electrons from the material with the lower electron-work-function to the material with a higher work-function will occur in the region where the surface separation occurs. Even though there is no net transfer of charge, on average, when particles of like material are separated, charge imbalances often occur, so that dispersed particles may carry net charges of either sign, and distributions of charges on individual dust grains can be measured [Muzumder, et al., 1990: 2004] and have been found to vary depending on the method of dispersement. In an open lunar environment nonuniform charge-patches on particle surfaces arising from tribocharging may partially equilibrate due to charge exchange with the plasma and or those "created" by additional photo-ionization. Tribocharging, and the resulting nonuniform surface-charge distributions on particles, however, could affect attraction and adhesion of particles to rovers, robots, or space suits outside, and on surfaces in any shielded environment. Triboelectric charging is not thoroughly understood, but insulating materials can be classified according to their location in the triboelectric series. This classification is consistent with an ordering according to a material's electron work function, <j>, usually expressed in eV [Sternovsky et al., 2002].

He-3 Bad – Dust – Kills Astronauts

Lunar dust causes health problems that kill astronauts

Khan-Mayberry 7 (Noreen, NASA Space Toxicologist, <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20070006527_2007005296.pdf>, 7-8-11, SRF)

In regards to lunar dusts there are several health questions that we have yet to answer. Several attributes of lunar dust cause concern when considering possible health effects to respiratory, dermal, ocular and cellular systems. Lunar dusts are highly abrasive, which could potentially erode the dermal water vapor barrier (the outer skin layers that are in place to keep internal water and heat from escaping the human body). Ocular concerns include effects ranging from minor irritation, physical or chemical injury. Respiratory injury could include compromised lung clearance mechanisms and the effectiveness of lung injury in a 1/6 g environment. Some fundamental questions include; how will the lower respiratory system handle the highly unusual shapes of lunar dust particles? Does cellular activity affect lung toxicity? Cellular level concerns include the generation of reactive oxygen species (ROS) in lung epithelia and lung macrophages. More questions to answer include dust reactivity. How quickly will these particles passivate? Does passivation decrease lunar particle toxicity? What is the effect of np-Fe° on toxicity?

Lunar dust destroys lung capacity and kills astronauts

Rincon 7 (Paul, Science reporter for BBC, *BBC News,* 3-18, <http://news.bbc.co.uk/2/hi/science/nature/6460089.stm>, 7-9-11, SRF)

"So we did some particle size determinations and discovered that a very large portion of lunar soil is potentially dangerous, approximately 1-3% of the total soil by weight." Most particles in lunar soil should get coughed up, or moved out of the lungs by specialised hairs called cilli. But any particles smaller than about 2.5 microns will stick in lung tissue. When dust is deposited in the lungs, inflammation occurs. Ultimately, scar tissue called a fibroid grows around the particle. This scar tissue replaces cells which facilitate the exchange of oxygen for carbon dioxide (CO2) in the lungs. The magnetic properties of lunar dust could be useful This is the process at work in the condition silicosis - an occupational hazard in mining, quarrying and foundry work - and asbestosis, which results from inhaling asbestos fibres. It also occurs in bronchitis and as a consequence of smoking. "If you took a healthy pair of adult lungs and smeared them out, they would cover a football field," Professor Taylor told BBC News. "Once you are down to the size of a square table's worth of surface area in your lungs that is useable; you are just about dead." Fine particles The team at the University of Tennessee has shown that about one percent by weight of lunar soil comprises particles less than one micron in size. A smaller - but still significant - fraction is less than 100 nanometres (billionths of a metre) in size. They determined that most of the fine particles in lunar dust are composed of glass formed through the impact of micrometeorites on the surface of the Moon. But the glass also contains metallic iron grains, much like that in a carpenter's nail and measuring just 10-20 nanometres in size. Machines could be sent to the Moon to "pave" its surface These grains, called "nano-phase iron", are so small that, if inhaled, some would pass directly from the lungs into the blood circulation. Once in the blood, the iron could "de-energise" the haemoglobin molecule which carries oxygen to the body's tissues. If enough gets dissolved in the blood, it could produce effects similar to carbon monoxide poisoning. However, exactly how much is required for this to happen remains an open question. In addition, when some fine dust particles are examined under the microscope, they can be seen to be filled with holes - like Swiss cheese. These vesicles give them a much larger surface area to react with the lung tissue, says Dr Yang Liu, a postdoctoral research associate at the University of Tennessee. "If you have a solid particle of dust and add vesicles, you can calculate how much the reactive surface area is increased. Sometimes you can get increases of up to a factor of five," she told BBC News. "With jagged particles, because of the way they follow the path of the air, there's a lower chance of them impacting the sinus walls at the back of the throat - which is the body's defence mechanism for keeping particles out of the lungs," said Dr Benjamin Eimer, another postdoctoral researcher at the University of Tennessee.

He-3 Bad – Dust – Kills Astronauts

Lunar dust is deadly-penetrates deep into lungs

SNL 8 (*Science NetLinks,* <http://www.sciencenetlinks.com/sci_update.php?DocID=352>, 7-9-111, SRF)

In the case of lunar dust, Prisk's work is just getting underway, but he cites several reasons to worry about the dust. First, as the report mentions, it gets into everything, so if it is toxic, the exposure level could be very high. Second, it has a jagged crystal structure that resembles fresh-fractured quartz, a toxic earth mineral. Third, in a low-gravity environment, small dust particles tend to penetrate more deeply into the lungs than they would normally, and deep lung tissue isn't as well equipped to neutralize toxic particles. To assess the potential risk to astronauts, researchers will conduct two types of experiments: lab studies on lunar dust itself and its effects on cell samples, and human studies in which volunteers inhale non-toxic particles during low-gravity flights on NASA aircraft. Only after years of research will scientists be able to estimate how much danger these and other environmental factors pose to astronauts.

Lunar dust is dangerous to astronauts

James and Kahn-Mayberry 9 (John, NASA’s Chief Toxicologist, Noreen, NASA Toxicologist, January, <http://humanresearchroadmap.nasa.gov/evidence/reports/lunar%20dust.pdf>, 7-9-11, SRF)

Our evidence base shows that prolonged exposure to respirable lunar dust could be detrimental to human health. Lunar dust is known to have a large surface area (i.e., it is porous), and a substantial portion is in the respirable range. The surface of the lunar dust particles is known to be chemically activated by processes ongoing at the surface of the moon. We predict that this reactivity will disappear on entry into the habitable volume; however, we do not know how quickly the passivation of chemical reactivity will occur, nor do we know how toxic the deactivated dust may prove to be. Although many Apollo astronauts seemed to tolerate lunar dust, their exposure times were brief and time (duration) exposure factors need to be determined. Other Apollo crew members and ground support personnel noted that the lunar dust was a sensory irritant. Finally, the size characteristics of the dust that actually was present in the atmosphere of the lunar lander have never been determined. Obtaining these data will help us understand the size distribution of the particles that are expected to be found in future lunar habitats. It is important to design experiments that will close or, at a minimum, narrow our knowledge gaps so that a scientifically defensible exposure standard can be set by NASA for protection of crew health.

He-3 Bad – Solvency – No Tech

Helium-3 energy isn’t viable—can’t outrun peak oil and it will take decades

Elhefnawy 7 (Nader, science and space writer, “The Rise and Fall of Great Space Powers” http://www.thespacereview.com/article/942/1 JF)

This obviously did not come to pass, and Heinlein’s argument that a Moon colony twenty years after 1980 is no more implausible than a Moon landing was twenty years after 1950’s Destination Moon can’t help but arouse some skepticism, even as a broader audience begins to take a second glance at these ideas. One may not hear the term “O’Neill cylinder” very often, but there has certainly been a revival of interest in space as a source of energy,whether through solar energy satellites, or the mining of the Moon for helium-3. (See “The limits to growth and the turn to the heavens”, The Space Review, January 2, 2007) This upsurge of interest may represent the anxieties of the moment more than any real move in this direction, of course, and as a practical matter can do little to alleviate the causes of those anxieties. The plans are too long range to do anything about the price of oil this year or the next, or if the peak oil theorists are correct, the big crunch due in the next decade. Helium-3 may not be a practical energy source for decades, if ever, and in either case, a great deal of work likely remains to be done both lowering the cost of space launch, and reducing the size and weight of the payloads needed to get a space-based infrastructure up and running. (See “Diversifying our planetary portfolio”, The Space Review, August 6, 2007) Still, if these or other such plans were realized they would mark the end of the time when space was just a critical node in terrestrial information flows, and the beginning of one in which space itself provides substantial, tangible, essential resources.

Transporting helium-3 from the moon destroys its value

Williams 7(Mark, Technology Review by MIT, “M8-23, http://www.technologyreview.com/printer\_friendly\_article.aspx?id=19296, accessed 7-6, JG)

Close points out that in a tokamak--a machine that generates a doughnut-shaped magnetic field to confine the superheated plasmas necessary for fusion--deuterium reacts up to 100 times more slowly with helium-3 than it does with tritium. In a plasma contained in a tokamak, Close stresses, all the nuclei in the fuel get mixed together, so what's most probable is that two deuterium nuclei will rapidly fuse and produce a tritium nucleus and proton. That tritium, in turn, will likely fuse with deuterium and finally yield one helium-4 atom and a neutron. In short, Close says, if helium-3 is mined from the moon and brought to Earth, in a standard tokamak the final result will still be deuterium-tritium fusion.

Multiple challenges tank solvency

Whittington 10 (Mark, Examiner, 6-22, http://www.examiner.com/clean-energy-in-houston/obama-is-ignoring-helium-3-on-the-moon-which-could-provide-clean-energy, accessed 7-5, JG)

That, as they say, is the good news. The bad news is that helium 3, while abundant, is spread out across the lunar surface, permeated in lunar soil in a handful of parts for billion. Mining and extracting helium 3 would be a considerable challenge. Transporting helium 3 back to Earth in an economical fashion would also be challenging. But the most difficult obstacle of all will be to create a helium 3 powered fusion generator that would produce more energy than it takes to create the fusion reaction. So far that has eluded researchers delving into all kinds of controlled fusion reactions. A desktop experiment at the Fusion Technology Institute in Madison, Wisconsin has yet to even break even for the energy generated vs. the energy imputed.

Current tech can’t solve – extends timeframe considerably

Blackman & Mueller 11 (Sarah & Rob, Mining Experts, 3-18, http://www.mining-technology.com/features/feature113053/, accessed 7-5, JG)

SB: What challenges would you face when mining on the moon that you wouldn't have to face on earth? RM: It is very different to mining on earth, primarily because of the low gravity; the gravity on the moon is about 1/6 of the gravity on earth. When you go to a typical mine on earth you will find heavy machinery such as large excavators. First of all, we won't be able to transport this type of equipment to the moon, and when you get there, the reaction forces are very low. So, we have to reinvent all the equipment that goes there and that's a big challenge. We need to address how to operate in a vacuum environment, away from the earth for five years or more with zero maintenance. Also, the lunar soil has highly abrasive dust which tends to damage equipment, so the life-time of equipment is a big issue on the moon. The best solution to avoid damage from the dust is to keep it off in the first place, so we are developing all kinds of seals, covers, mechanisms and shielding to keep the dust away.

He-3 Bad – Solvency – No Tech

The mining process is difficult & isn’t feasible in the status quo

Committee on Science 4 (Presented before Congress, 4-1, http://commdocs.house.gov/committees/science/hsy92757.000/hsy92757\_0.HTM, accessed 7-7, JG)

We do know this, though, mining helium-3 from the Moon would be a massive, difficult operation. At the most promising locations, helium-3 makes up no more than about one part in 100 million, and it is almost exclusively found in the upper ten meters of the regolith, perhaps the upper three meters. Thus, to mine one ton of helium-3 per year, which one group suggested as a goal to fuel a working fusion reactor, we would have to move 100 million tons of dirt, which is comparable to some of the largest terrestrial mines. It is difficult to imagine this being a robotic operation. The minimum amount of the Moon that would have to be mined to match that one ton a year is about seven square kilometers per year, and it wouldn't take very many years to mine enough of the Moon that you could see the Moon—the mine from Earth with binoculars. I would stress that at present, a full assessment of the feasibility of mining helium-3 is far cheaper and simpler than actually trying to mine it. The assessment would include learning more about the lunar regolith at various depths at various locations around the Moon, determining the relative value of helium-3-based fusion reactors, the cost of other potential sources of helium-3, not to mention developing and testing mining techniques. Also, I would point out that there are many other lunar resources for which extraction would require far less ambitious projects. So, my three main points: First, the Moon holds valuable clues as to the early history of the Earth at a time when life was forming. Second, helium-3 is a potentially valuable resource, but extracting it from the Moon is a difficult process. There should be more basic assessment before attempting to implement anything. And finally, the work I have talked about will be accomplished far more easily with humans on the Moon than without.

Mining has many technological & technical problems

Gertsch 9 (L., Rock Mechanics and Explosives Research Center, 4-20, http://www.lpi.usra.edu/meetings/lro2009/pdf/6031.pdf, accessed 7-5, JG)

The unknowns listed above lead to engineering challenges expected during lunar mining and excavating. Regolith in situ is tightly compacted and contains varying densities of pebbles, rocks, and boulders. Even without the cementing effect of intergranular ice, undisturbed regolith deposits require some force to fragment and excavate [9]. Mass usually provides the reaction force for surface mining, yet launched mass will be at a premium. Can the materials needed for the pre-manufacturing stage of lunar presence be obtained from the more easily excavated upper layers? Digging becomes more difficult with depth, possibly plateauing below some critical depth. This, in addition to the presence of oversized particles, will require development of techniques for real-time ahead of-the-face sensing and machine control. This is part of the challenge of sufficient characterization of the target material, which needs to be more complete than on Earth to offset the difficulty of the additional challenges of remote operation, maintenance, and repair. Mining and excavation equipment is built to be robust, because it must deal with significant -- and difficult-to-characterize -- ranges of material behavior. This is true in any natural geologic material. Longterm operation of such equipment in the unfamiliar and extreme environment of the Moon adds the difficulties referred to above. Any prototype technology, or old technology used in a new way or a new place, requires significant development and testing. NASA is familiar with this, but the greatest challenge will be whether humanity yet has the political and financial will to carry the process through well enough to encourage success.

Lunar mining economically unfeasible because of regolith

Galea 9 (Pat, Tau Zero Foundation, 11-9, http://www.centauri-dreams.org/?p=10149, accessed 7-7, JG)

Parkinson presented some background on the Jovian extraction process, and examined some other options that have been suggested. One possibility is to extract He3 from the lunar regolith. Unfortunately, it appears that while this is technically possible, the huge energy required to extract meager amounts of He3 from immense masses of regolith renders the process economically unfeasible. In brief, the Jupiter mining system is still the preferred option for fueling Daedalus.

He-3 Bad- Conflict

Helium-3 moon colonization triggers space conflicts and weaponization

Beljac 8(Marko, U of Melbourne, “Arms Race In Space” http://www.fpif.org/articles/arms\_race\_in\_space March 31 JF)

As noted, China has tested an anti satellite weapon and Russia has stated that it would not allow other states to control space and threaten its own space assets. In Asia a nascent space race seems to be developing between China, Japan and India. In the far future the large deposits of Helium-3 on the moon's surface could lead to a militarized race to colonize the moon to secure Helium-3 for nuclear fusion energy technologies based on a nuetronic fusion reactions in the context of depleting hydro-carbons. 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. The deployment of space weapons means that the first shot in a nuclear war would be fired against these early warning satellites. Currently strategic planners in Moscow have about 10 minutes between warning of an attack and the decision to launch nuclear weapons in response before they impact. Weapons in space would lower this in certain scenarios down to seconds. This would also apply for weapons placed in space that would be considered to be defensive such as say a space based BMD interceptor or a “counter-ASAT” weapon.

Attaining helium-3 will cause conflict

Hatch 10(Benjamin, attorney, Emory International Law Review Vol. 24 P. 261-262 JF)

The historical conflicts over imperialist regimes and colonialism tend to suggest that when powerful states have an interest in amassing something that exists in large, previously un-owned quantities in one location, they will inevitably come into conflict with one another. States have a limited economic interest in the Antarctic,218 and so they are unlikely to invest military assets and the necessary financing to vindicate or broaden their claim to something that is not generating them any wealth. In contrast, states seem to believe that they have potentially great economic interests in the Moon and, accordingly may have a correspondingly large motivation to have conflicts over it.219 Exploration of the Moon will benefit humanity—on Earth, new technologies will be have to be developed to aid states in the new space race—and on the Moon, providing new opportunities for human growth and expansion.220 Whatever name a regime wants to give to the Moon—res nulliusor res communes—the Moon represents an unparalleled opportunity. Imagine a situation where one state was able to not only find large quantities of Helium-3 or some other valuable resource on the Moon but also succeeded in denying access to other states. That state would enjoy a tremendous economic advantage by cornering the market in some ultra-rare, useful commodity. Resources by their nature breed conflict.221 As demonstrated above, states will soon be converging on the Moon to reap the benefits that it may provide. Given the recent actions by the United States and China, and the spirit of conquest and competition that seems to be informing the current Moon rush, the vague and generic OST will not be able to sufficiently stop state conflict over the greatest economic opportunity in history.

He-3 Bad- Conflict

Lunar Helium-3 generates dangerous suspicion between the U.S. and Russia

Blomfield 7 (Adrian, The Telegraph Moscow, “Russia Sees Moon Plot in NASA plans” http://www.telegraph.co.uk/news/worldnews/1550246/Russia-sees-moon-plot-in-Nasa-plans.html May 1 JF)

Mankind's second race for the moon took on a distinctly Cold War feel yesterday when the Russian space agency accused its old rival Nasa of rejecting a proposal for joint lunar exploration. The claim comes amid suspicion in Moscow that the United States is seeking to deny Russia access to an isotope in abundance under the moon's surface that many believe could replace fossil fuels and even end the threat of global warming. Yesterday Anatoly Perminov, the head of Russia's Federal Space Agency Roscosmos, said: "We are ready to co-operate but for some reason the United States has announced that it will carry out the programme itself. Strange as it is, the United States is short of experts to implement the programme." While the Americans have either been coy or dismissive on the subject, Russia openly says the main purpose of its lunar programme is the industrial extraction of helium-3."Whoever conquers the moon first will be the first to benefit,"said Ouyang Ziyuan, the chief scientist of China's lunar programme. But many officials in Moscow's space programme believe Washington's lunar agenda is driven by a desire to monopolise helium-3 mining. They allege that President Bush has moved helium-3 experts into key positions on Nasa's advisory council. The plot, says Erik Galimov, an academic with the Russian Academy of Sciences, would "enable the US to establish its control of the energy market 20 years from now and put the rest of the world on its knees as hydrocarbons run out."

China intends to be first to capitalize on Helium-3

Lasker 6 (John, The Capital Times, “Future In Fusion?” 12/23-24 JF)

But scientists and investors have taken notice. Nearly all of UW fusion research is privately funded. And

meanwhile, with China, India, the European Space Agency and at least one Russian corporation all pursuing plans for a manned lunar base in the coming decades, there is increasing talk of a race to control this fuel,one shuttle load of which could theoretically power the United States for a year. But the nation now determined to gamble on the moon’s helium-3 bounty is not the United States, but China. Among all the nations and private investors interested in the potential of the moon’s fuel, it is China that is steadfast on winning what it apparently feels isa helium-3 race – one that could already be far past its starting point. Ouyang Ziyuan, chief scientist of China’s lunar program, has told the international press, “We will provide the most reliable report on helium-3 to mankind,’ and “Whoever first conquers the moon will benefit first.”

He-3 Bad- Weapons

Lunar Helium-3 mining will lead to dangerous super weapons

McGruther 9 (Kevin, Gunnison Observatory , 11-19, http://gunnisonobservatory.org/tag/kevin-mcgruther/, accessed 7-8, JG)

More valuable to scientists than water on the Moon is Helium-3, which is super-rare on Earth, and exists on the Moon in relative abundance compared to Earth. Helium-3 is a stable element that is exceptionally valuable in nuclear technology. It allows a reaction to occur without turning components of a nuclear reactor radioactive, which is great for nuclear energy on Earth. Helium-3 is also optimal for use in nuclear fusion weaponry, hydrogen bombs, because it is stable and will not decay. Nuclear weapons have shelf lives because they rely on radioactive elements that decay rendering them impotent over time. Helium-3 use in nuclear weaponry would mean that a nuclear weapon would have infinite shelf life (given infinite longevity of all other variables, which is improbable). Many scientists are not ignorant to the fact that every piece of technology that can be used for good can also be used for evil. Many scientists are or choose to ignore that fact for shortsighted personal gains. Habitation of the Moon and subsequent mining could potentially result in human kinds’ rapid exploration of deeper space and safer nuclear energy on Earth or it could result in more efficient weapons of destruction to wield over Earth. My observation is that for every helpful technology produced there is also produced an equal and opposite danger.

Nuclear weapons using fusion would be more destructive and destroy nonproliferation

Zerrifi and Makhijani 99 (Hisham, Assist. Prof of Global Issues @ U of British Columbia, and Arjun, President of the Institute for Energy and Environmental Research, Peace Magazine January/February JF) 7/6

Nuclear weapons changed in 1953, when nuclear fission(the splitting of atoms) and nuclear fusion(the fusing, or joining of atoms) were combined, creating thermonuclear weapons, known more generally as "hydrogen bombs." So far, only a fission explosion has generated the high temperatures and pressures necessary to trigger the thermonuclear explosion in a hydrogen bomb. For this reason, all current generation thermonuclear weapons have a fission "primary" that sets off a fusion explosion in the "secondary."However, pure fusion weapons, that is, weapons that would not need a fission trigger, have long been thought of as "desirable" by nuclear weapons designers, in part because they would not produce fission-product fallout. The scientific feasibility of pure fusion weapons has not yet been demonstrated, but if the technical hurdles are overcome, the use of nuclear weapons as instruments of war could be fundamentally transformed, introducing new proliferation dangers and radically reducing the chances of getting complete and enduring nuclear disarmament. Thermonuclear explosions, unlike explosions caused by chain reactions in fissile materials like plutonium, do not require a minimum critical mass. Thus, pure fusion weapons could be made with very low yields, and would not produce fallout, blurring the distinction between conventional explosives and nuclear explosives. Yet, the lethality of the weapons, due to neutron radiation and explosive force, would still be great.1 In fact, the radius of lethality of small pure fusion weapons per unit of explosive power would be far greater than that of large fission weapons.2 For instance, the destructive area per ton of TNT equivalent of the Hiroshima bomb was a hundred times smaller than the estimated lethal radius of a one-ton TNT equivalent pure fusion bomb. The adverse implications of this military arithmetic for nuclear nonproliferation and disarmament would be profound.

He-3 Bad- No ITER

ITER won’t use Helium-3—not feasible

Schirber 8 (Michael, MSNBC, “How Moon Rocks Could Power The Future”, http://www.msnbc.msn.com/id/26179944/ns/technology\_and\_science-science/t/how-moon-rocks-could-power-future/ JF)

"Our real challenge is not obtaining the helium-3; it is demonstrating that we can burn it," Kulcinski said. Burning helium-3 requires higher initial energy than burning hydrogen isotopes. This is why ITER is not considering helium-3 as a possible fuel at this time. "One should never say never — it may come to pass that helium-3 could become an important source of energy in the coming century," Spudis said. "That time has not come yet. And I suspect that it is still some time off."

He-3 Bad – Turn – Aliens (1/2)

Helium-3 mining creates an atmosphere on the Moon – degrades any chance of putting optical telescopes on the Moon

Duke et. al. 5 (Michael, Colorado School of Mines, Lisa Gaddis, G. Taylor, Harrison Schmitt, 1-12, http://www.lpi.usra.edu/lunar\_resources/developmentofmoon.pdf, accessed 7-9, JG)

Although it is not our intention to address the topic of the lunar environment topic at length, it is worthy of a brief summary here. In particular, preservation of the lunar environment is a cross-cutting theme that must he considered at any level of exploration or development significantly beyond that undertaken by Apollo. Many of the unique uses of the Moon are dependent on preserving its existing environment. For example, the use of optical telescopes on the Moon would be degraded if a significantly greater lunar atmosphere was created by human activities. The lunar atmosphere was modified by the Apollo landings, and effects were detectable for several months after the landings (Johnson et al. 1972). Use of the Moon's vacuum for fabrication would also he impeded if the atmosphere were to become contaminated. Volatile constituents released into the atmosphere can be condensed onto the surface or lost from the Moon. Apollo experiments measured the daytime and nighttime lunar atmosphere's concentration of natural species (e.g., Hoffman et al. 1973; see also Stern, 1999). Vondrak (1989) suggested that intense human activities could lead to a permanent lunar atmosphere, but only at very high levels of effort such as those associated with 'He mining. Thus, understanding of atmospheric dynamics and composition should he undertaken before human exploration becomes a continuous activity. Active experiments in which known quantities of gases are released into the atmosphere at different times of the lunar day and their fate is followed by similar surface instruments are required to understand the potential effects of gases released by human activities. In addition, unique features of the Moon can be altered by incautious human contamination of the lunar environment. The unique implantation effects of the solar wind can become contaminated if additional gases with different isotopic compositions become the prevalent molecules in the lunar atmosphere.

Unblocked radio telescopes on the Moon are key to finding alien life

**Gavaghan 88** (Helen, Staff Scientific American, “A Moon with a view” Jul 28 AQB)

Scientists would set up cosmic and gamma ray observatories and a radio telescope. They would do life sciences research and search for extraterrestrial intelligence. The radio telescope should be established on the side of the Moon that always faces away from the Earth so that radio waves from the planet do not contaminate the data. A satellite in orbit round the Moon could relay data from the radio telescope back to Earth. Some scientists think, however, that the satellite might also pick up and transmit radio waves from the Earth, negating, the advantage of putting the telescope in that position. The main advantage for the astronomers of working on the Moon is the lack of atmosphere. However, activities such as mining then become important because of the particles that such activity would release into the near-vacuum that surrounds the Moon. Spent rocket propellant could also contaminate the environment. Technical difficulties, though, are not the only ones facing the next pioneers of the Moon. International legal questions will also be asked. Do the resources belong to the first people to get there or to all nations? If they belong to all nations, why should particular countries finance missions to the Moon? Argentina proposed an international treaty, adopted by the United Nations, that says the Moon is the world's common heritage. But neither the US nor the Soviet Union is a party to this treaty (New Scientist, 7 July, p 41). This legal and perhaps moral problem is already an issue. It surfaced when Mendel briefed students at the International Space University on the project to develop a commercial space base. One student from India declared that she could not participate because such a scheme would put developing countries at a disadvantage. The technical problems might turn out to be the easiest to solve in the second conquest of the Moon.

He-3 Bad – Turn – Aliens (2/2)

Contact with a distant civilization solves all negative impacts

Tough 6(Allen, PhD Professor at the Univ. of Toronto, 8-10, http://ieti.org/tough/articles/intro.htm, 7-9, JG)

This report examines five sorts of long-term consequences that could result from contact. To give you an overview before you read the next chapter, here is the core of each of the five. 1. Practical Information We might well receive practical information and advice that helps our human civilization to survive and flourish. Possible examples include technology, transportation, a new form of energy, a new way of producing food or nourishing ourselves, a feasible solution to population growth, more effective governance and social organization, fresh views on values and ethics, and inspiration to shift direction dramatically in order to achieve a reasonably positive future. The message might also bring home to people the importance of eliminating warfare or at least eliminating weapons of extraordinary destruction. Viewing ourselves from an extraterrestrial perspective might be very useful in reducing our emphasis on differences and divisions among humans, and instead seeing ourselves as one human family.2. Answers to Major Questions We might gain new insights and knowledge about deep major questions that go far beyond ordinary practical day-to day matters. Topics in an encyclopedia-like message or close up dialogue could include astrophysics, the origin and evolution of the universe, religious questions, the meaning and purpose of life, and answers to philosophical questions. We might receive detailed information about the other civilization (which might be deeply alien to us) and about its philosophies and beliefs. Similar information could be provided about several other civilizations throughout our galaxy, too. We might even receive a body of knowledge accumulated over the past billion years through contributions by dozens of alien civilizations throughout the galaxy. What sorts of consequences will contact have for our religious ideas and institutions? Some religions may be deeply shaken by contact, or at least need to re-examine their set of beliefs. It seems clear, however, that humanity's religions have already flourished over many centuries despite a variety of scientific discoveries that conflict with religious views. And several religions have already incorporated the idea of extraterrestrial life. Although some religious leaders may denounce an extraterrestrial dialogue, most will surely embrace it as further evidence of God's infinite greatness.

He-3 Bad – Turn – OST (1/2)

Helium-3 mining violates the OST

Duke et. al. 5 (Michael, Colorado School of Mines, Lisa Gaddis, G. Taylor, Harrison Schmitt, 1-12, http://www.lpi.usra.edu/lunar\_resources/developmentofmoon.pdf, accessed 7-9, JG)

Some people will be opposed to the notion of disturbing the Moon's surface for any reason, particularly economic reasons. The repair of surface disruptions will occur only at timescales of billions of years, so commitment to a surface project that alters the lunar surface should be carefully considered. Most lunar activities that can now be imagined occur at scales that cannot be observed from Earth even with large telescopes. Mining of He is a potential exception, because very large surface areas of the Moon would be disrupted. The lunar power system concept of Criswell and Waldron (1990) would also be constructed at a scale large enough to he seen from Earth. The environmental issues associated with these very large scale project should be considered and discussed, within the same kind of framework in which environmental decisions are now made on Earth. including consideration of the economic benefits to he gained by the project. The Outer Space Treaty prohibits adverse changes or harmful contamination of the lunar environment caused by national (or private) activities on the Moon.

The OST constitutes customary international law – success is key to international law standards

Hurewitz 94 (Barry Hurewitz, Attorney, http://www.law.berkeley.edu/journals/btlj/articles/vol9/Hurewitz.pdf, 1994, accessed 7-9, JG)

Finally, the free access principles articulated in the Outer Space Treaty constitute binding international law independent of the Outer Space Treaty. Commentators have noted that, based on the behavior of states in the international community, there is ground for the assumption that "all the members of the international community are bound by the fundamental principles and rules contained in [the Outer Space Treaty] because these principles and rules have acquired the status of general customary [international] law."48 Customary international law applies to all states, including those not parties to the Outer Space Treaty.49 For a principle or practice to become recognized as customary international law, three basic conditions must be met. First, the practice must be widespread.50 Second, it must arise from a sense of legal obligation.51 Finally, it must be long-standing in practice,52 as determined by an appropriate international authority.53 The first requirement-widespread adherence to an international norm-may be satisfied by states' explicit acceptance of the rule or by states' acquiescence to it.54 The right of free and equal access to space is widely recognized under this standard, since most of the world's nations explicitly accepted the norm by voting for Resolutions 1721 and 1962 and by signing the Outer Space Treaty.55 With regard to the second requirement, the free access principles set forth in the Outer Space Treaty were generally considered to be legally binding obligations even before the treaty was drafted. Subsequent statements by signatories indicate that the treaty is commonly viewed, in large part, as a codification of principles which had already evolved into binding customary international law.56 Some commentators have questioned the continued vitality of the third traditional requirement-that a rule be "long-standing" before rising to the level of customary international law.57 Given the rapid and open development of national activities in space, "the development of customary legal principles has become an accelerated process rather than a gradual evolution."58 Consequently, "[t]he passage of only a short period of time after the beginning of the exploration and use of outer space did not prevent the customary norms of the international law of outer space from coming into existence."59 Thus, the fundamental principles set forth in the Outer Space Treaty, including freedom of use and exploration, prohibition of national appropriation, and non-prohibition of military equipment, bind all nations as customary international law, notwithstanding any one state's interpretation of the terms of the treaty.60 These concepts had crystallized into customary international law even before the drafting of the 1967 treaty.61 To summarize, the 1967 Outer Space Treaty articulated pre-existing norms of customary international law, including the right of all states to enter space freely for exploration, use, and scientific investigation, without discrimination or national appropriation, and in accordance with general principles of international law. Moreover, the treaty established that states are free to employ any technology, civilian or military in origin, for peaceful activities in space or on celestial bodies. The United States fully supported all of these principles and is bound by them either as a treaty signatory or under customary international law.

He-3 Bad – Turn – OST (2/2)

International law solves every impact including extinction

Demonchonok 9 (Prof. Edward Demenchonok, President, Department of English and Foreign Languages, Fort Valley State University, “From Power Politics to the Ethics of Nonviolence and Co-Responsibility”, accessed 7-9, JG)

TODAY WE WITNESS a contrast between the two tendencies concerning international relations. One is a power politics and hegemonic unipolar model, pursuing an elusive goal: "to create a dominant American empire throughout the world." (38) An alternative to this is the philosophers' call for nonviolence, co-responsibility, and "the cosmopolitan model of democracy" to be implemented by strengthening the network of transnational grass-roots movements and international institutions, including the United Nations. The idea of a hegemonic-centered world order is a recent version of what Kant two centuries ago called a "world republic," warning that it would become an amalgamation of the nations under a hegemonic state like a despotic "universal monarchy." Kant noticed that, since this is not the will of the nations, this idea cannot be realized, and thus as an alternative he proposed a league of nations or a pacific federation of free states as a basis for peace in the world. (39) Although world hegemony is an unrealistic and failed project, attempts of its implementation are undermining the collective efforts in establishing a peaceful and just world order since World War II. The project of a hegemonic-centered world order means abandoning the international system based on the rule of law and collective actions (including collective security), and replacing it by unilateral actions of individual states (or coalitions of states). Removing the existing legal-procedural constraints on the use of force will result in the stronger states becoming unchecked, while the weaker ones remain unprotected. This would also mean falling back toward the violent, unlawful "state of nature." The prospects of a unipolar hegemonic world look grim: a world of "social Darwinism," where the divided nations would be dominated by a hegemonic power, bur each nation would be left on its own in striving for survival in a hostile environment. Facing the economic challenges and the negative consequences of climate change and other environmental problems, the poor nations would be the most vulnerable. The major powers would more aggressively compete for the dominant position and control over the economy and the limited natural resources of the planet. Since the decisive factor in this competition is military force, this would boost militarization and the arms race, thus increasing the possibility of wars and the escalation of global violence. A traditional reaction to social and global problems is governmental reliance on force and power politics, accompanied by "emergency" measures and a myth of protection. This simplistic approach obfuscates the root causes of the problems and thus is unable to solve them. Instead, the resulting arms race, the infringement of civil liberties, and the tendency toward neototalitarian control have become problems in themselves, keeping society hostage to a spiral of violence. (40) For those politicians who rely mainly on military "hard power" rather than on the "soft power" of diplomacy, the reasoning seems to be that the use of force is a quick and efficient means for the solution to the problems of security, stability, human rights, and so on. However, many human and social problems by their very nature can not be resolved by force, and an unrestricted use of force can make things even worse, creating new problems. Even well-intentioned leaders or "benevolent hegemons," being limited by their political cultures and interests, cannot know whether the consequences of their policies and actions are equally good for all. Therefore, policies and decisions that potentially could affect society and the international community must be based on collective wisdom in a broad context, through deliberative democracy, international multilateral will-formation, and inclusive legal procedures, thus equally considering the cognitive points of view and interests of all those potentially affected. The complex, diverse, and interdependent high-tech world of the twenty-first century requires genuinely robust democratic relations within society and among nations as equals, an adequate political culture, and an enlightened "reasoning public." Otherwise, a society that has powerful techno-economic means bur is ethically blind and short-sighted could ultimately suffer the same fate as the dinosaurs, with their huge bodies bur disproportionately small brains.

He-3 Bad – Decommissioning Nukes

Governments decommission nuclear weapons for helium-3

OTM 10 (Open Talk Magazine*,* <http://www.opentalkmagazine.com/technology/science-research/3018-helium3-earths-next-generation-power-source.html>, 7-6-11, SRF)

But as good as it may sound to be, we are still far off from constructing a fully-functional fusion reactor based on helium-3. First, the deuterium-helium-3 fuel requires more heat than the D-T fuel to initiate a fusion reaction, which means that you still need to feed it with more energy than what it can produce. And second, there is no abundant source of helium-3 on our planet. Most of what we have here on Earth is limited only to the helium-3 accumulated from “decomposed” nuclear weapons that are currently decommissioned by their respective governments.

Mining Helium-3 from the moon trades off with getting it from decommissioned weapons

Plumer 11 (Brad, Associate Editor at the New Republic, 6-3, <http://www.hctlaw.com/pages/2011/06/americas-looming-helium-crisis-no-really/>, 7-6-11, SRF)

Now, scientists might be able to invent new weapons detectors, but helium-3 has also been proposed as a fuel for next-generation fusion reactors. Trouble is, there’s just not all that much helium-3 to go around. There’s plenty of the stuff in the earth’s mantle, but it’s nearly impossible to retrieve, and manufacturing tritium (which decays into helium-3) is fantastically energy-intensive. Harvesting the gas from decommissioned nuclear weapons was always the most economical approach. One option left would be to mine it from the moon’s surface: indeed, Russia and China have both said that helium-3 mining would be a major goal of future lunar explorations.

Demand for Helium-3 results in decommissioning weapons

Marder 11 (Jenny, Reporter @PBS News Hour, 2-16, <http://www.pbs.org/newshour/rundown/2011/02/helium-3-shortage-reaches-across-sectors.html>, 7-6-11, SRF)

But here's the problem: the helium 3 supply is extremely scarce and depleting rapidly. Helium 3 only represents .0001 percent of the nation's helium. Most of the nation's supply has been plumbed from the decay of tritium, an isotope of hydrogen, which is used to make nuclear weapons. Helium 3 is produced when nuclear weapons are dismantled, but with stockpiles shrinking, less tritium means less helium 3.

He-3 Bad – Decommission Good

Continued decommissioning leads to the eventual disarmament of Israel which prevents a regional nuclear war

Bowen and Presbo 9 (Wyn, Centre for Science and Security Studies, King’s College and Andreas Verification Research Training and Information Centre, “How might states, or the international community, go about implementing the dismantlement of nuclear weapons systems in an accurate way which would engender international confidence?” Feb AQB)

As a partial illustration of these questions it is useful to briefly examine the case of the Middle East. The Middle East is probably the most extreme example to consider because the region, more than any other, illustrates the complexities and sensitivities associated with formulating operational configurations for dismantlement. The region is characterised by enduring conflicts and animosities at the Arab–Israeli and intra-Arab levels and within the context of Iran’s post-1979 relations with its Arab neighbours, on one hand, and Israel on the other. The role of external powers has also been an enduring security dynamic, with the United States playing the key role in this respect since the 1980s most recently with the invasion of Iraq in 2003. Israel, of course, is the only de facto nuclear weapon power in the Middle East, and the political-strategic conditions in the region do not currently appear conducive to Israel taking a decision to dismantle its nuclear weapons capability any time soon. Down the line, of course, Israel may not be the sole nuclear weapon power in the region—with Iran currently causing the greatest concern on this front— and this would add further layers of complexity in terms of configuring a regional dismantlement process. Nevertheless, it is informative to speculate about those governments that would need to be represented at the operational level if Israel opted to dismantle its nuclear weapons in a way that generated and maintained the regional confidence needed to ensure the long-term durability of a nuclear disarmament agreement. For example, it would be essential to involve countries—which are all currently non-nuclear weapons states—that are neighbours of Israel and/or have been in direct or indirect conflict with that country at some point over the past 40 years or so. The list of countries is relatively lengthy and would probably need to comprise Egypt, Jordan, Syria, Iraq, Iran, Saudi Arabia, Lebanon and potentially Libya. The national threat perceptions and strategic postures of these countries have been influenced by assessments of Israel’s military intentions and capabilities at both the conventional and nuclear levels. The representation of some, or all, of these countries in the verification process would appear crucial to generating confidence on the part of former adversaries and antagonists that Israel had truly complied with any commitment made to disarm. Such representation would also be important if the link between chemical and nuclear disarmament, which countries like Egypt and Syria have traditionally made, is to be cut. On this front it could be expected that Israel would insist on reciprocal representation in a regional verification process in the chemical area.

HE-3 Bad- AT: Supply Shortage

Their shortage claims are hype—stable now

Physics Today 11 (“For Some, helium-3 supply picture is brightening” may JF)

The US inventory of 3He has stabilized since shipments from the US stockpilefor use in radiation portal monitors were halted early in 2009 and an interagency task force took over control of distributions (see PHYSICSTODAY, June 2010, page 22). By then, the Domestic Nuclear Detection Office (DNDO) had drawn an estimated 60000 liters from the US reserve to equip the approximately 1300 3He-guzzling monitors that have been installed at US ports and border crossings. With that drain on supply plugged, and a modest new quantity of gas identified, the US stockpile should now last until 2017 or 2018, says Joseph Glaser, senior adviser to the undersecretary for counterterrorism at the Department of Energy’s (DOE’s) National Nuclear Security Administration (NNSA). The recycling and purification of the tritium contained in nuclear warheads is expected to yield 8000 to 10000 liters of 3He annually, says Glaser. In addition, a one-time supplement of 8000 to 10000 liters from the decay of tritium in storage beds at the NNSA’s Savannah River Site(SRS) was recently determined to be economically recoverable at today’s higher price for 3He. That material is to be extracted in 2012, he says.

HE-3 Bad- AT: Prolif Detection—Alt Substances

There are alternative radiation detectors to Helium-3

Swiderski et al 10 (IEEE explore, Lukasz, Marek Moszynski, Dariusz Wolski, Joanna Iwanowska, Tomasz Szezesniak, Guntram Pausch, Cristina Plettner, Juergen Stein, Paul Schotanus, Chuck Hurlbut, and Jacek Szabelski; all members of IEEE. IEEE Transactions On Nuclear Sceicne Vol. 57.5 October P. 2857 JF)

HE-3 counters[1] are widely used as neutron detectors not only because of their high sensitivity to neutrons, but also of capability of simple implementation of -ray rejection. They are applied in border monitoring as well as in neutron scattering experiments in laboratories providing neutron beams. Unfortunately, expected worldwide shortage of He-3[2], reported in recent years, led to a steep increase in its price. Thus the search for alternative neutron detectors is of a great interest. Liquid scintillators have a potential to replace He-3 counters in neutron detection. Especially, B-10 loaded liquids have been studied[3]–[7], as they are able to detect both fast and slow neutrons without external moderators, which are essential when using He-3 tubes. Based on our experience with B -10 loaded liquid scintillators from previous tests [8], [9], we have compared the performance of an EJ309B5 detector and a He-3 counter.

There are numerous possible alternatives to Helium-3—the government can give incentives for development

Shea and Morgan 10 (Dana and Daniel, specialists in science and technology policy, “The Helium-3 Shortage: Supply, Demand, and Options For Congress” 12/22 Pg. 5, 19-21 JF)

In addition, federal agencies have accelerated the development and testing of technological alternatives to helium-3 for homeland security purposes. Much of this activity has taken place through the DOE national laboratories. Successful development and implementation of alternative technologies may lead to reduced helium-3 demand. One way to address the helium-3 shortage would be to reduce demand by moving helium-3 users to alternative technologies. For the largest application, neutron detection, the DOE national laboratories and others have examined numerous alternatives. As discussed below, some technologies appear promising, though implementation would likely present technical challenges. For other applications, alternative technologies may not currently exist. Because of its detection performance, nontoxicity, and ease of use, helium-3 has become the material of choice for neutron detection. Nevertheless, other materials also have a long history of use. With the current shortage of helium-3, researchers are reexamining past alternatives and investigating new ones. Existing alternative neutron detection technologies have significant drawbacks relative to helium-3, such as toxicity or reduced sensitivity. A drop-in replacement technology does not currently exist.57 The alternatives with most short-term promise as helium-3 replacements are boron trifluoride, boron-lined tubes, lithium-loaded glass fibers, and scintillatorcoated plastic fibers. A new scintillating crystal composed of cesium-lithium-yttrium-chloride (CLYC) also appears promising. Other materials, less suitable in the short term, show promise for the long term. Before the helium-3 shortage became apparent, most neutron detection research was directed toward long-term goals such as improving sensitivity, efficiency, and other capabilities, rather than the short-term goal of matching current capabilities by alternative means.58 For medical imaging, alternative gases exist that could potentially be used in much the same way as helium-3. The most discussed example is xenon-129, which may be a viable alternative for some medical imaging applications within 5 to 10 years.61 The required properties of the inhaled gas are very specific, however: polarizability, no toxicity or anesthetic effect, and a high signalto-noise ratio for the MRI process. Helium-3 is not the only gas with these properties, but it has increasingly become the preferred choice. Congress could encourage the development and implementation of alternative technologies in a variety of ways. For federal uses such as homeland security, Congress could simply direct agencies to change the technology they use. For the private sector, it could mandate or provide incentives for the use of alternatives. Congress could also attempt to stimulate future availability by funding research and development or demonstration projects or by giving the private sector incentives to do so. Widespread federal use of alternatives might indirectly increase their availability and desirability for the private sector.

\*\*\*Tritium DA\*\*\*

Tritium DA 1NC (1/2)

Helium-3 shortage now

HSNW 11 (Homeland Security Newswire, “The U.S. faces severe shortages; nuclear detection, science suffer” 4/20 JF)

This week, members of the U.S. Congress will consider what to do about a serious shortage of helium-3 that is disrupting both scientific research and nuclear security. Helium-3 is invaluable for some scientific instruments, but supplies have been used up in making security systems to detect dangerous nuclear materials, and production can not be increased. On Thursday, a House subcommittee will try to pin down what went wrong and how to fix the problem.

Influx of Helium-3 halts production of tritium

Schmitt et al 4 (Harrison, former U.S. Senator and Aerospace consultant, Mark Henley, Boeing, Kim Kuhlman, Physical Sciences Institute, Gerald Kulcinski, Assoc. Dean @ U of Wisconsin-Madison, John Santarius, Prof of Engineering U of Wisconsin-Madison, Lawrence Taylor, Planetary Geosciences Institute; “Lunar Helium-3 Fusion Resource Distribution” Pg. 4 JF)

Helium-3 fusion power promises much lower capital and operating costs than its Twenty-first Century competitors due to greatly reduced materials damage and radioactive waste production, no tritium breeding, higher energy conversion efficiency**,** smaller size, no radioactive fuel, no air and water pollution, a major reduction in cooling water requirements, and at worst only low level radioactive waste disposal requirements. Recent estimates suggest that about $5 billion in investment capital will be required to develop and construct the first commercial prototype of a helium-3 fusion power plant (Schmitt, 2006, pp. 68-73). The development program would pursue, in parallel, several fusion approaches optimized for helium-3 fuel, ultimately focusing on two approaches for a power plant demonstration "fly-off" before beginning prototype plant construction. Financial breakeven at wholesale electricity prices of ~$0.05 per kilowatt-hour could occur after five, 1000 megawatt plants were on line, replacing old conventional plants or meeting new demand. [$0.05 per kilowatt-hour reflects the 20 day moving average minimum with maximum at ~$0.14 in the 2005-2009 period (Perry, 2009).]

Tritium is essential to US nuclear stockpiles

Hafemeister 3(David, emeritus professor @ California Polytechnic State University, review of “Tritium On Ice: The Dangerous New Alliance of Nuclear Weapons and Nuclear Power” by Kenneth Bergeron JF)

Tritium is a key component in the primary stage of a nuclear weapon. Without tritium–deuterium fusion boosting in the primary, the secondary will not explode with significant yield. Tritium does not add much energy to the primary's fission yield, but it shortens the time. It takes about 80 doubling generations for a primary to explode, but by getting a quick dose of neutrons, generations can be skipped, saving time before violent disassembly. By increasing the fission efficiency of the 239 Pu or 235 U, less material is needed, and the size of primaries can be reduced.  The US has not produced tritium since 1988, relying instead on existing supplies. But these are being depleted by the spontaneous decay of tritium (half‐life 12.3 yr), and the Department of Energy decided in 1998 to resume production, at the Tennessee Valley Authority's (TVA) Watts Bar reactor. Kenneth Bergeron's Tritium on Ice raises three main concerns about this decision: (1) The urgency of the need for tritium. (2) The breach in the traditional separation between military and commercial fuel cycles. (3) Reactor and environmental safety issues.  The need for more tritium: Bergeron correctly points out that the need for tritium is driven by US plans to maintain a large enduring stockpile of nuclear weapons. One might think that the 2002 Strategic Offense Reduction Treaty (SORT) would lead to a reduction to 2200 warheads, but the US desire for flexibility, with a large "responsive force" and a considerable number of spares, actually suggests a total of about 10 000 warheads. J. Cirincioni [Phys. and Soc. 31, 14 (July 2002)] considers the following stockpile for the year 2012:

Tritium DA 1NC (2/2)

U.S. nuclear forces support overall primacy— capabilities are far ahead of Russia and China

Lieber & Press 6 (Keir and Daryl, Foreign Affairs April/March, “The Rise of U.S. Nuclear Primacy” JF)

Even as the United States' nuclear forces have grown stronger since the end of the Cold War, Russia's strategic nuclear arsenal has sharply deteriorated. Russia has 39 percent fewer long-range bombers, 58 percent fewer ICBMs, and 80 percent fewer SSBNs than the Soviet Union fielded during its last days. The true extent of the Russian arsenal's decay, however, is much greater than these cuts suggest. What nuclear forces Russia retains are hardly ready for use. Russia's strategic bombers, now located at only two bases and thus vulnerable to a surprise attack, rarely conduct training exercises, and their warheads are stored off-base. Over 80 percent of Russia's silo-based ICBMs have exceeded their original service lives, and plans to replace them with new missiles have been stymied by failed tests and low rates of production. Russia's mobile ICBMs rarely patrol, and although they could fire their missiles from inside their bases if given sufficient warning of an attack, it appears unlikely that they would have the time to do so. China's nuclear arsenal is even more vulnerable to a U.S. attack. A U.S. first strike could succeed whether it was launched as a surprise or in the midst of a crisis during a Chinese alert. China has a limited strategic nuclear arsenal. The People's Liberation Army currently possesses no modern SSBNs or long-range bombers. Its naval arm used to have two ballistic missile submarines, but one sank, and the other, which had such poor capabilities that it never left Chinese waters, is no longer operational. China's medium-range bomber force is similarly unimpressive: the bombers are obsolete and vulnerable to attack. According to unclassified U.S. government assessments, China's entire intercontinental nuclear arsenal consists of 18 stationary single-warhead ICBMs. These are not ready to launch on warning: their warheads are kept in storage and the missiles themselves are unfueled. (China's ICBMs use liquid fuel, which corrodes the missiles after 24 hours. Fueling them is estimated to take two hours.) The lack of an advanced early warning system adds to the vulnerability of the ICBMs. It appears that China would have no warning at all of a U.S. submarine-launched missile attack or a strike using hundreds of stealthy nuclear-armed cruise missiles. The intentional pursuit of nuclear primacy is, moreover**,** entirely consistent with the United States' declared policy of expanding its global dominance. The Bush administration's 2002 National Security Strategy explicitly states that the United States aims to establish military primacy: "Our forces will be strong enough to dissuade potential adversaries from pursuing a military build-up in hopes of surpassing, or equaling, the power of the United States." To this end, the United States is openly seeking primacy in every dimension of modern military technology, both in its conventional arsenal and in its nuclear forces.

Nuclear deterrence prevents WMD use and conventional conflict

Durr 2 (William, Lt. Colonel U.S. Army, “Nuclear Deterrence in the Third Millenium” pg. 2-3 4/9 JF)

Nuclear weapons provide the credible response capability of the U.S. military. The purpose of these weapons is to deter the use of WMD - nuclear, chemical, and biological - in crisis or conflict. Nuclear deterrence prevents other possessors of nuclear weapons from using them by the threat of nuclear retaliation. The nuclear force may also be used to threaten and to discourage biological, chemical or large-scale conventional aggression. During the Cold war, the U.S. threatened the use of nuclear weapons to deter a massive conventional attack by the Soviet Union against NATO. Additionally, the U.S. did not rule out the first use of nuclear weapons in such an event.6

Tritium DA- Deterrence Good

Deterrence is best check to conflict

Krieg 10(Marcus, U of Oregon, “Is Zero the Right Number? The Debate over Abolishing Nuclear Weapons” Pg. 31-33 JF)

Lawrence Freedman wisely stated that, “Some [leaders] might be beyond deterrence but that does not mean they are invariably so.”61 The point Freedman is making here is not that nuclear deterrence threats will always fail, but that they will not always work. The world is not as black and white as experts on both sides of the abolition debate suggest. It is clear by now that deterrence is imperfect, but some abolitionists take this imperfection too far and suggest that nuclear deterrence is weak and weakening.62 Still others propose that conventional weapons can replace nuclear weapons for deterrence purposes. Paul Nitze, a renowned expert and senior official in both Republican and Democratic administrations, suggests that the increasing effectiveness of conventional weaponry makes nuclear weapons unnecessary:  The United States should consider what might seem at first glance a step backward: converting its principal strategic deterrent from nuclear weapons to a more credible deterrence based at least in part upon “smart” conventional weapons…Can they adequately carry out their combat missions? If so, will that fact deter aggression as effectively as nuclear weapons appear to have done? I believe the answers to these questions are, in general, positive and that a strategic conventional military option may become more practical for many strategic missions previously thought of as a nuclear preserve…From a policy perspective, there should be a conscious decision by the government to pursue the conversion of our strategic deterrent from nuclear to conventional weapons.63 In response to this proposition, Keith Payne offers an interesting insight:  If U.S. strategic deterrence requirements truly can be equated to the “package of capabilities” necessary to threaten the destruction of an opponent’s designated targets, and if U.S. conventional weapons can threaten those same targets with the same expected deterrent effect, the logic of this position would be coherent, even persuasive. Despite the many assertions that presume each of these propositions to be true, both remain largely unexamined.64 While conventional weapons may be increasingly capable of replacing nuclear weapons as far as destructive capacity is concerned, nuclear weapons still remain the world’s most powerful deterrent. No other capability can match nuclear weapons for devastation, both physical and psychological. Even the increasingly powerful conventional weapons, which approach nuclear capabilities in destructive capacity, lack the psychological impact that nuclear weapons retain. Sanctions, conventional attacks and international pressure are all deterrents that work in some instances, but nuclear weapons may have more deterrent capacity than any of these. Recall that deterrence takes place in the mind of the actor being deterred, thus providing nuclear weapons with a value‐added component over conventional weapons due to the psychological impact of nuclear threats. The United States destroyed dozens of Japanese cities and inflicted far more damage with firebombing campaigns than with nuclear weapons, but it was the psychological impact of those first two nuclear weapons that destroyed the Japanese will to continue fighting during WWII.  In summary, nuclear deterrence threats will not work in all instances with all leaders, but they will work better, even if just marginally, than other types of deterrence threats. Nuclear weapons do have a value‐added component relative to other weapons, making them more useful for deterrence than conventional weapons. Payne suggests that they “may be so much more lethal and distinguishable from non‐nuclear threats that, on occasion, they can deter an opponent who would not otherwise be susceptible to control.”65 In the vast majority of instances, conventional means of deterrence will likely be sufficient. Under other circumstances, deterrence in general will be entirely insufficient and conflict will ensue. However, it is those instances that fall between these two scenarios that nuclear weapons still have a place.

\*\*\*ASATs DA\*\*\*

ASATs DA 1NC

Helium-3 is key to ring laser gyroscopes

CRS 10 (*Congressional Research Service*, 12- 22, <http://www.fas.org/sgp/crs/misc/R41419.pdf>, 7-8-11, SRF)

Department of Defense guidance and navigation systems for munitions, missiles, aircraft, and surface vehicles include ring laser gyroscopes that use helium-3. Testing and qualification are under way on an alternative gas for this purpose.55

Laser Ring Gyroscopes are crucial for creating ASATs

Cowan 10 (Mark, <http://www.battlesnake.co.uk/_uni/gyro.htm>, 7-8-11, SRF)

Due to the accuracy, robustness and low maintenance needs of optical gyroscope systems, they have been a large success with the military. The notorious AC-130U gunship uses ring-laser gyroscopes[10] in addition to standard GPS systems in order to provide fast directional information. The primary inertial-reference system on the Boeing 777 uses Honeywell laser gyroscopes[11], as do some of Boeing's other commercial planes including the 757 and the 767[17]. Another interesting use is on a USAF anti-satellite missile: ASM‑135 ASAT, which also uses a Honeywell ring laser gyroscope[12].

Increased ASATs cause other countries to build more of their own, increasing risk of nuclear escalation

Schneider 81 (Barry, senior defense analyst at the National Institute for Public Policy, “Preventing Star Wars,” *The Bulletin,* Volume 37:No. 8, October, pgs. 14-15, 7-8-11, SRF)

The 1972 ABM Treaty pledges both the United States and Soviet governments not to interfere with the national technical means of verification (for example, via reconnaissance satellites) of the other. The Convention of the International Telecommunications Union bans radio frequency interference, such as destroying or disabling a communications satellite. Article II of the 1971 U.S.-Soviet Accidents Measures Agreements requires immediate notification in the case of interference with any early warning system. Finally, the 1974 Agreement on the Prevention of Nuclear War would oblige both superpowers to abstain from such satellite interference if it poses a risk of war. To blind early warning systems would be an extreme provocation. Moreover, it might be unintelligent to do so. As one Pentagon analyst has said, "If they put out our eyes, they have only succeeded in warning us." What has not been covered by treaty law is a ban on the testing or deployment of conventional anti-satellite weapons. The Soviets currently have a crude missile-borne anti-satellite system with capabilities against only a few low-flying U.S. reconnaissance, ocean-surveillance, transit and weather satellites. The U.S. Miniature Homing Vehicle, launched from a rocket fired from under an F-15 wing, is being designed for accuracy against satellites. The size of a garbage can, this vehicle would ram the target satellite at speeds of 17,000 miles per hour, enough to pierce the armor of a battle tank or battleship; certainly adequate to demolish a fragile satellite in space. The U.S. military would like to steal a temporary march over the Soviets by testing the miniature homing vehicle. Unfortunately, the full testing of operational high-altitude anti-satellite weapons by either side would probably foreclose forever the possibility of negotiating an adequately verifiable ban on anti-satellite weapons. After full anti-satellite weapons testing was completed, any Soviet space rocket would be a potential weapon. To the Soviets any F-15 might carry an anti-satellite capability. Moreover, the miniature homing vehicle mechanism that guides the U.S. anti-satellite weapon is also an important part of the new U.S. ABM weapon. Deploying and testing the homing vehicle may be challenged as a violation of the ABM Treaty, since it might be usable in ballistic missile defense. By insisting on keeping our own anti-satellite options open for possible future use against Soviet satellites, we foreclose the possibility of negotiating a ban on weapons that threaten our own satellites. Mutual satellite vulnerability or invulnerability are the real options before us, not unilateral superiority. By insisting on an anti-satellite solution to the problem posed by Soviet satellites, the military services are opening up numerous other problems for the operation of all U.S. military forces, given their dependence upon satellite systems. The anti-satellite weapons problem today is like the MIRV problem of a decade ago. Then, the United States declined to explore seriously the possibilities of banning these multiple in-dependently-targetable reentry vehicles during the SALT negotiations with the Soviet Union. We have been paying a sleep price ever since. Clearly the MIRVed world today is more dangerous than an un-MIRVed world would have been. The United States chose to deploy a weapon that gave us a temporary advantage rather than trying to ban such systems. American decision-makers engaged in the wishful thinking that ours was the last move in the game. Now we face hundreds of MIRVed Soviet SS-I7S, SS-18S and SS-19S that have the potential to destroy much of our fixed-silo land-based Minuteman and Titan missile forces. Henry Kissinger was later to lament: "I wish I had thought through the implications of the MIRVed world when the MIRV program was approved." An ASAT world, like a MIRVed world, is dangerous for both sides. The Reagan administration and the Soviet government must move quickly to reconvene the anti-satellite arms control talks. Failure to ban testing and deployment of anti-satellite weapons can lead to an action-reaction arms race in space with no logical end in sight. Both sides will try to match the other's offensive ASAT forces; both will try to develop anti-satellite defenses. Expenditures for space weapons will rise dramatically. Full testing anti-satellite weapons will close the door on ever banning such weapons in the future. Moreover, developments in anti-satellite and those in anti-ballistic missile capabilities might become indistinguishable, thus undermining the ABM Treaty — the most important achievement of the SALT process to date.

ASATs DA- UQ

Current ASAT tension between the US and China encourages building more

Cook 11 (Michael, writes for FieldLogix, <http://www.fieldtechnologies.com/new-wikileaks-docs-reveal-ongoing-satellite-battles-between-us-and-china/>, 7-8-11, SRF)

New documents published by WikiLeaks have revealed an ongoing, heated satellite battle between the US and China. The US has not been involved in a Star Wars type battle like this, that we know of at least, in over 23 years. According to the leaked documents, both the US and China shot down their own satellites using missiles in a showdown of capabilities and strength. The dispute started on January 11, 2007 when China shot down one of its own weather satellites. The strike, which resulted in thousands of pieces of debris orbiting the earth, raised fears that the Chinese had the power to cause chaos by destroying US military and civilian satellites, and GPS systems. Ever since, the US and China have been involved in an ongoing dispute over the development of anti-satellite (ASAT) capabilities. The US has not taken part in an anti-satellite (ASAT) launch since 1985.

ASATs DA – Impact –Space Junk

ASAT tests increase space junk

GISC 8(Global Innovation and Strategy Center, January, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA497909>, 7-8-11, SRF)

Anti-satellite Missile Test (China) You can pollute a stream or an ocean for a long time and not see any consequence…by the time you see something, it may be very difficult or very costly to remedy the environment. – Dr. Nicholas Johnson, NASA Two major events in the first quarter of 2007 caused concern within the international space exploration community and are briefly described here. On January 11, 2007, the Chinese government used an anti-satellite missile to destroy an aging but still active weather satellite. By all accounts, the collision between the anti-satellite missile and the FC-1 weather satellite caused the satellite to burst into thousands of fragments that scattered into the atmosphere within an hour of the “test.” Chinese officials did not acknowledge or confirm the test until January 22, 2007. International opinion was critical of the test due to the significant amount of debris that resulted. The United States was aware of two prior anti-satellite weapon tests (ASAT) by the Chinese on July 7, 2005 and February 6, 2006. In both prior instances, the U.S. did not file diplomatic protests either bilaterally or in a multilateral forum.

**Space junk kills satellites and prevents future space travel**

Schwartz 10(Evan, Wired Magazine, “The Looming Space Junk Crisis: It’s Time to Take Out The Trash” http://www.wired.com/magazine/2010/05/ff\_space\_junk/ 5/24 JF)

On clear winter nights, when the trees are bare, Donald Kessler likes to set up a small telescope on the back deck of his house in Asheville, North Carolina, and zoom in on the stars shining over the Blue Ridge Mountains. It’s not the most advanced home observatory, but the retired NASA scientist treasures his Celestron telescope, which was made in 1978. That also happens to be the year Kessler published the paper that made his reputation in aerospace circles. Assigned to the Environmental Effects Project Office at NASA’s Johnson Space Center in Houston, the astrophysicist had gotten interested in the junk that humans were abandoning in the wild black yonder—everything from nuts and tools to defunct satellites and rocket stages the size of school buses. In that seminal paper, “Collision Frequency of Artificial Satellites: The Creation of a Debris Belt,” Kessler painted a nightmare scenario: Spent satellites and other space trash would accumulate until crashes became inevitable. Colliding objects would shatter into countless equally dangerous fragments, setting off a chain reaction of additional crashes. “The result would be an exponential increase in the number of objects with time,” he wrote, “creating a belt of debris around the Earth.”Then, on February 10, 2009—just a little more than three decades after the publication of his paper—the Kessler syndrome made its stunning debut. Some 500 miles over the Siberian tundra, two satellites were cruising through space, each racing along at about 5 miles per second. Iridium 33 was flying north, relaying phone conversations. A long-retired Russian communication outpost called Cosmos 2251 was tumbling east in an uncontrolled orbit. Then they collided. The ferocious impact smashed the satellites into roughly 2,100 pieces. Repercussions on the ground were minimal—perhaps a few dropped calls—but up in the sky, the consequences were serious. The wreckage quickly expanded into a cloud of debris, each shard an orbiting cannonball capable of destroying yet another hunk of high-priced hardware. Incidents like these served as clear signs from above that something must finally be done about space junk. Its proliferation threatens not only current and future space missions but also global communications—mobile phone networks, satellite television, radio broadcasts, weather tracking, and military surveillance, even the dashboard GPS devices that keep us from getting lost. The number of manufactured objects cluttering the sky is now expected to double every few years as large objects weaken and split apart and new collisions create more Kesslerian debris, leading to yet more collisions. NASA’s Bacon puts it bluntly: “The Kessler syndrome is in effect. We’re in a runaway environment, and we won’t be able to use space in the future if we don’t start dealing with this now.”

Aff – ASATs DA Non-UQ

Obama reducing ASATs now but China isn’t

Ceren 11(Omri, PhD candidate for argumentation and media at USC, 1-28, <http://www.commentarymagazine.com/2011/01/28/obamas-new-anti-satellite-weapons-push-to-cede-space-to-the-chinese/>, 7-8-11, SRF)

So naturally — per Eli Lake’s extensive report this morning — the Obama administration is pushing for a U.S./EU agreement that would severely restrict our ASAT capabilities. Experts who back the administration describe it as a “not exactly binding” minor move, the upshot being that Obama wouldn’t have to secure Senate approval for the measure. But experts and congressional staffers both insist that it would significantly curb what we can do in space and would endanger our ability to develop and deploy both offensive and defensive assets: [A] congressional staff member said: “There is a suspicion that this is a slippery slope to arms control for space-based weapons, anti-satellite weapons and a back door to potentially limiting missile defense.”… “Because it appears that they are talking about limiting operations … it could be that this is as much an agreement on the law of war as it is on arms control,” Mr. Spring [a defense analyst at the Heritage Foundation] said. “If it is something more like a law-of-war agreement, then you are creating a situation of legal jeopardy for a military commander who is responsible for operating systems in space.” Presumably, the argument is that if we give up ours, they’ll give up theirs. The muddy, cascading norms argument is always trotted out when people push for unilateral disarmament, which is what opposing space militarization means in an age of Chinese ascendancy. In a full-blown movement, you’ll find the argument buttressed by everything from “at least our side won’t be complicit” moral preening to “it’ll snowball into a global movement, then there won’t be any more sides” activist nonsense. But it’s always there, in part because we have a surplus of foreign-policy experts churning out implausible advantages for their pet policies — and then selling those fanciful pretexts as objective evaluations. If stopping Israeli construction in a particular Jerusalem neighborhood can placate Afghanis who’ve never seen a map of Israel, is it too much to suggest that unilateral Western gestures on space militarization will cause Beijing to abandon its ASAT program? Turns out, there’s an answer to that: The State Department has exchanged language with the EU on the code of conduct. The U.S. and Russia also have begun talks about creating confidence-building measures regarding space-based activities. The U.S. has reached out to China on space issues, but Beijing has declined offers to discuss the issue, according to a senior State Department official. [emphasis added]

Aff – ASATs DA AT: Escalation

**ASATs don’t cause any reaction**

Berkowitz 89(Marc, director for space policy in the Office of the Assistant Secretary of Defense, Winter, http://www.airpower.au.af.mil/airchronicles/apj/apj89/win89/berk.html, 7-9-11, SRF)

In short, the action-reaction model is not a satisfactory explanation for Soviet arms behavior. Despite the lack of empirical evidence, critics of a US ASAT capability confidently predict that it would promote arms race instability on the basis of a specious theory of arms race dynamics. They fail to consider seriously the possibility that Soviet weapons programs are driven primarily by their own internal logic and objectives. Thus, they overlook the evidence that doctrinal requirements are the principal driving forces behind the Soviet Union's military space posture.20 Fear of the effect of reactive Soviet ASAT deployments on arms race stability should not lead people to oppose a US ASAT program. Opposing this program in the belief that responsive Soviet ASAT deployments would degrade stability is predicated on the assumption that the Soviet Union will not pursue additional ASAT capabilities unless motivated by US actions. Yet, acquisition of a US ASAT capability would not lead to reactive Soviet ASAT deployments. As discussed below, the Soviet Union has been actively developing ASAT capabilities for years in accordance with military doctrinal requirements for attaining and maintaining military space superiority in order to deny the United States and its allies the use of space.

Aff – ASATs DA AT: Space Junk

**ASATs don’t increase space debris-they can use an enveloping bag instead**

Dinerman 7(Taylor, board of advisors for SpaceEnergy, The Space Review, 1-22, <http://www.thespacereview.com/article/789/1>, 7-9-11, SRF)

Fortunately, a few years ago a proposal was floated for as class of weapons that would destroy target spacecraft without directly creating any debris. This type of “co-orbital” ASAT would approach its target and envelop it with an airbag covered in a type of sticky substance. It would then fire a thruster so that the conjoined satellites would burn up in the atmosphere. If it worked as designed, no debris would be created. In practice it would be no easy task to design, test, and operate such a weapon, but it is not beyond the state of the art and would not create any debris. Figuring out what kind of sticky material is right for such a system would, by itself, be a fascinating project. The substance might have applications in other military and perhaps civil space systems. If the sticky airbag solution proves too difficult, the same goals might be reached using an ASAT equipped with grappling arms that would grasp the target before pushing down towards the atmosphere. The challenges of such a system are evident, not the least of which would be the need for some sort of decision-making software that would choose the best places to seize the enemy satellite during the final moments before contact.

\*\*\*International Authority CP\*\*\*

**International Authority CP 1NC (1/2)**

Counter plan text: The United States federal government should propose to the General Assembly of the United Nations to enact article 11 paragraph 5 of the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies in accordance with article 18 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.

Major space powers agree to the CP – current international cooperation and Obama’s multilateral focus both prove

Bilder 9 (Richard, Prof. Law @U of Wisconsin-Madison, <http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=2180&context=ilj>, 7-9-11, SRF)

There are, however, several reasons suggesting that the U.S. should seek to reach international agreement on such a regime quite soon and even before the possibility and practicality of a permanent moon base and an He-3-based fusion power program are clearly established. First, as discussed, states and enterprises are unlikely to be willing to undertake the substantial effort and investment involved in developing lunar He-3 mining and He-3-based fusion power without the assurance of political and legal stability that only a broadly accepted international agreement can provide.127 Given the long lead time which will be required if the United States wishes to achieve a viable He-3-based fusion power program in the relatively near future—perhaps within the next half-century or so—it seems sensible for it to begin to take steps to put the necessary legal infrastructure in place fairly soon. Second, the international climate is arguably now relatively favorable to achieving international agreement on the kind of international lunar resource regime the United States hopes to achieve. Other major players, such as China, the European Union, India, Japan, and Russia, which currently appear to have the capability to participate in the potential exploitation of lunar resources, may well now share an interest with the United States in a more open-access regime and market-based mechanisms.128 The U.N. General Assembly's adoption of the 1994 implementation agreement nullifying the provisions of part XI of the LOSC to which the United States objected clearly reflects a broader international acceptance of a U.S.-favored approach to the exploitation of deep seabed "common heritage" resources more favorable to the participation of free enterprise, which serves as persuasive precedent for the similar treatment of lunar resources.129 Indeed, there is now growing support in the United States for U.S. ratification of the LOSC and accession currently seems increasingly likely.1\*1 In addition, international cooperation among the major technologically-advanced countries in both space and fusion power development is already ongoing under the International Space Station and ITER agreements131andthe Obama administration appears to look favorably on cooperative multilateral rather than unilateral approaches to dealing with broad international issues.132 Moreover, the recent spike in oil prices'33and heightened international concern about global warming154 reinforce the pressing need of the global economy to find ways to meet the world's growing appetite for energy while still decreasing greenhouse gas emissions, and thus to renewed international interest in the development of alternative energy sources such as nuclear fission and fusion.

Other countries would agree to the Moon Agreement to get the US to join

Bilder 9 (Richard, Prof. Law @U of Wisconsin-Madison, <http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=2180&context=ilj>, 7-9-11, SRF)

As already mentioned, the current parties to the agreement might be willing to agree to one of these possible arrangements in order to encourage and facilitate participation by the United States and other space powers in the agreement.154 Discussions in recent meetings of the Legal Committee of COPUOS suggest that the parties to the Moon Agreement, as well as other states, are actively exploring the possibility of revisions, arrangements, or other accommodations that might persuade the United States and other countries to ratify and accede to the agreement.155 Once again, international experience with the analogous situation involving seabed minerals is suggestive, where a majority of states in the U.N. General Assembly were prepared to negotiate and adopt the 1994 implementation agreement modifying the mineral resource regime set out in part XI of the LOSC in the hope of encouraging the United States and other important states to join the LOSC.'56

International Authority CP 1NC (2/2)

A multilateral legal regime for lunar exploitation solves all scenarios for conflict in space

Moltz 9(James, associate prof. of National Security Affairs @Naval Postgraduate School in Monterey, Strategic Studies Quarterly Pg. 82-83 Fall, <http://www.au.af.mil/au/ssq/2009/Fall/moltz.pdf>, JF)

Establishing a peaceful framework for lunar governance will be important, because hostile international relations on the moon are likely to lead to conflicts elsewhere in space and, possibly, on Earth. Such patterns regarding new frontiers have plagued the history of international relations for centuries. Indeed, despite frequent hopes for cooperation, most unclaimed territories historically have become sources of international conflict rather than serving as peaceful lebensraum. Typically, and consistent with realist predictions about international politics, states have had a built-in penchant to pursue relative gains over their rivals and therefore have sought to seize and defend new resources to their own advantage. On the other hand, successful formation of a stable, transnational governance system—a mechanism for sharing or otherwise peacefully allocating the moon’s resources—could open the possibility for mutually beneficial and self-sustaining lunar commerce and settlement, consistent with neo-liberal institutionalist predictions. Such a model could have positive spin-of effects on Earth and set a cooperative pattern for further human exploration and development of the rest of the solar system, spurring states to pool resources and engage in joint approaches to space’s many challenges. In such scenarios, hopes for “humankind” efforts in space—rather than state-driven rivalries—might be realized, something for which astronauts and cosmonauts who have visited space have often called. As Per Magnus Wijkman wrote on these issues in 1982, the “interdependence” of all actors in space provides “strong incentives” for the emergence of cooperative solutions.1 Yet predictions from the literature on collective goods suggest that governing the “global commons” of space and the moon is likely to become increasingly difficult when infinite resources face claims by multiple, self-interested actors. Such trends historically have led to processes of “enclosure” rather than successful collective management.2 thus, the question facing lunar settlement is: Can such conflicts be avoided and, if so, how?

International Authority CP – Solvency

A space resource authority would enable peaceful and equitable exploitation of space resources that provides incentive for exploration and benefits to developing countries

Zell 6 (Jeremy, JD Candidate U of Minnesota Law School, “Putting A Mine on the Moon: Creating an International Authority to Regulate Mining Rights in Outer Space Note” Minnesota Journal of International Law 15 Pg. 509-511, 518 JF)

Like the ISA, the SRA should consist of an administrative body whose responsibilities and authority are divided among different organs. The SRA’s Council should be the most powerful bodyand retain duties identical to the ISA’s Council; namely, implementing the regime through approving and regulating exploration and exploitation working plans. The SRA’s Council membership should mimic that of the ISA’s, save that the SRA Council should not reserve seats for representatives of the developing world. Developing countries would still have the opportunity to serve on the Council but they should not be guaranteed a seat. A commonly raised criticism during the drafting of the Moon Agreement was that the equitable sharing provisions should be interpreted too harshly against the industrialized world if the developing world was giving too much power. The United States was partially concerned with the implementation of outrageous royalties. This criticism was one of the reasons the United State and other industrialized nations refused to take part in the treaty. Limiting developing nations’ influence on the Council will work to stem similar fears because the Council, through advice from its Finance Committee, should be responsible for setting and collecting permit fees and royalties from outer space mining activities. The permit process would be identical to the ISA’s. Firms or nations can prospect for free, but prospecting would convey no proprietary rights over discovered materials. After discovering potential minable materials, a firm or nation would pay a fee to receive an exploration permit and an additional fee at the exploitation phase.The Council would set the amount of fees a firm must pay.The SRA should adopt the spirit of the ISA’s Enterprise but alter it significantly. Under the ISA, prospectors who submit exploration plans of work must reserve enough surface area to support a second mining operation and reserve half of the value of the minable materials for extraction by the ISA. The Enterprise is the ISA’s arm responsible for extracting the reserved materials. Under the SRA, firms and nations should remain responsible for reserving surface area and half the value of minable materials to the SRA’s Enterprise, but the SRA’s Enterprise should not engage in mining operations. The ISA’s enterprise is responsible for mining the areas reserved to it but to date it has not been formed. If it begins operating, it is intended to contribute to the ISA’s self-sufficiency. Some question the wisdom of leaving the ISA to profit from the operation of deep seabed mines while simultaneously writing and enforcing the regulations that govern those operations. The SRA’s Enterprise should avoid potential conflicts of interest by separating itself from actually operating mines. Instead, the SRA’s Enterprise should manage the reserved surface areas and minable materials. It should possess the power to sell or rent surface and subsurface easements and ownership interest in reserved minable materials. The proceeds would then be equitably distributed among non-spacefaring developing nations as well as used to promote the establishment of space-related enterprises in the developing world. The SRA’s Enterprise should be substantially, if not exclusively, administered by representatives of developing nations, as elected by the Assembly. The time for the formation of a regime to govern the exploration and exploitation of space resources is overdue. Activities undertaken by the United States, China, and other potentially space-faring nations represent the beginning of a twenty-first century space race which will be inextricably tied to mining rights on the Moon, the planet Mars, and NEA’s. By viewing the territory of outer space as being vested in the international community, a workable authority to government mining interests in space can be established. The Space Resource Authority proposed in this article would create economic incentive for nations and firms to simultaneously invest in outer space and developing nations. The hope is that, by eliminating disagreement over the meaning of the Common Heritage Concept, the international community can begin to peacefully develop outer space’s resources in a way that truly benefits all of humanity.

International Authority CP – Solvency

International authority solves—overcomes incentive barrier and ensures peaceful operations

Bilder 9 (Richard, Emeritus Prof of Law @ U of Wisconsin, “A Legal Regime for the Mining of Helium-3 on the Moon: U.S. Policy Options” Pg. 55-57 JF)

Whatever formsuch a cooperative international institutional arrangement took, it would be designed and serve to provide access and influence to all nations, participants, investors, and customers in the development and use of He-3-based fusion power, alleviate conflict and discontent over which nation or nations should control lunar resources or resource-related operations on the Moon, and assure that the benefits of He-3-based fusion energy would be widely shared by all nations and peoples throughout the world. Amongthe more important objectivesof such an organization or enterprise would be:(1) raising the necessary capital to sustain the development of a technologically and economically viable He-3-based fusion energy system; (2) developing the necessary fusion and lunar He-3 recovery technology; (3) assuring effective continued and environmentally-sound maintenance and operation of terrestrial and lunar fusion-energy related facilities and services; (4) assuring reliable supplies of He-3 and other resources to terrestrial customers; (5) maintaining reasonable and uniform rate structures to all users; (6) assuring access to proprietary technologies, resources and profits related to a fair valuation of members participation and contribution; and (7) resolving disputes among members concerning their participation in such an enterprise. However, neither nations nor private commercial enterprises are likely to be willing to commit resources to an He-3-based fusion energy program absent a stable and predictable legal regime governing lunar resources that provides reasonable assurance that any such effort and investment will be rewarded and can be carried on without controversy or disruption. Yet, at present, international space law fails to establish any detailed rules governing the mining, ownership and exploitation of He-3 and other lunar resources or to provide such assurance. Consequently, if the U.S. seriously contemplates the possible development of He-3-based fusion energy, it is in its national interest to take steps to establish what it would consider as an acceptable and agreed-upon international lunar resource regime – and to do so relatively soon.

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International Authority CP- Solvency

Lack of stable legal authority for space mining discourages things like the plan, need the CP to solve

Zell 6 (Jeremy, JD Candidate U of Minnesota Law School, “Putting A Mine on the Moon: Creating an International Authority to Regulate Mining Rights in Outer Space Note” Minnesota Journal of International Law 15 Pg. 490-491, 518 JF)

Today, a twenty-first century space race is on the verge of beginning. This race will be different in spirit and kind than its predecessor. It will include new actors. China in particular has made astonishing strides toward outer space supremacy since beginning its space program in 1992. The new actors will not be limited to nations. Private firms have begun to see commercial possibilities in the stars. The first space race was rooted in cold war politics. Now that the ability of nations to enter space and conduct activities there has been proven, the new space race will be grounded in economic principles. Commercial interests such as tourism and outer space mining will drive private firms to engage in activities in outer space. The mining of Earth’s Moon, the planet Mars, and Near Earth Asteroids (NEAs) holds the potential to be very lucrative endeavour. Scientists believe that silicon on Mars, Helium-3 on the Moon, and other precious ores such as platinum on NEAs could sustain information and energy technologies on Earth for decades or centuries, However the current legal uncertainty regarding property rights on the Moon and other celestial bodies limits the possibility of outer space mining. Legal scholars and nations have hotly debated ambiguous language in the Outer Space Treaty and Moon Agreement declaring outer space to be the “common heritage of mankind.” Until this confusion is resolved, it will be difficult or impossible for firms or nations to realistically consider the feasibility of mining outer space, and it will continue to be seen as a science fiction fantasy.

A new legal entity is necessary to fairly exploit resources on the moon

Miller and Coit 8 (Joseph and David, Worcester Polytechnic Institute, “Lunar Property and Mining Rights” May 26 JF)

The mining, water, and property laws of the Earth have been ignored in the OST but the experience of the past has some bearing on plans for the Moon, and should be reviewed in terms of creating new rules and establishing a general policy. Actual laws elaborating on the protection of property will have to be written in the next decade if they are to precede the actual construction of facilities and the claiming of strategic territories de facto, by setting up a base and using local resources. Frankly, some current treaty rules may have to be set aside after reconsideration and whole new legal entities and frameworks created. It would be easier to do this on logical and rational grounds before people representing given nations start settling in territories, as then they will have interests to protect and rules will benefit one actor at the expense of others. Now it can be done as a matter of principle, at least so far as the current space faring nations are concerned.

International Authority CP – Solvency

An international authority is feasible—the law of the sea serves as a model

Brittingham 10 (Byron, teaches Business and Law courses in various countries at overseas universities, Oregon Review of International Law Vol. 12.31 P. 48-51 JF)

I do not disagree with any of these points. However, new technologies, such as Space Elevators,82 are under development and may greatly reduce the cost of trips outside of the Earth’s gravity. He-3 fusion generators, although presently consuming more energy than they produce, may yet prove practical.83 Further, methods of mining He-3 have already been developed.84 These hurdles, with further research, will be easily overcome within the next thirty to fifty years and since to achieve any form of international diplomatic consensus on operating in space may take at least a decade or two, we will need to develop these new rules and regulations for operating in space soon. The good news is we need not start from scratch. There already exists a body of law that can be adapted, perhaps easily, to the needs of outer space. The U.N. Convention on the Law of the Sea (UNCLOS) has provisions for managing the traffic on the surface and the resources on the deep seabed.85 Space, like the sea, has vast amounts of area that is impractical for any one nation to claim. Hugo Grotius, a pioneer of international law, preferred the term res extra commercium in referring to the open ocean. He proposed the “freedom of the seas” doctrine, whereby the ocean is insusceptible of ownership as it cannot be occupied, and no one has the “right to appropriate things which by nature may be used by everybody and are inexhaustible.”86Being incapable of ownership and available for everyone’s use are the very same concepts expressed in Article I of the Outer Space Treaty that allow freedom of access and exploration and grant freedom of movement throughout. The Law of the Sea Treaty contains the very same concepts and almost the very same words to describe the territories of the deep sea bed as are used in the Preamble and Article I of the Outer Space Treaty to describe space. UNCLOS also speaks to the resources of the sea being the common heritage of mankind, requiring “the equitable and efficient utilization of their resources.”87 [T]he area of the seabed and ocean floor and the subsoil thereof, beyond the limits of national jurisdiction, as well as its resources, are the common heritage of mankind, the exploration and exploitation of which shall be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States.88 And UNCLOS further emphasizes the seabed being the common heritage of mankind by denying any attempts of sovereignty, once again very similar to the Outer Space Treaty.“No State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty or sovereign rights nor such appropriation shall be recognized.”8More importantly, both of these situations concern mining for resources in places that take extensive planning and a vast investment to exploit and the Law of the Sea Convention already contains a detailed process of establishing a claim and mining for resources. As one author explained, UNCLOS “was established to handle issues including navigational rights, conservation and management of limited resources, protection of the environment, and dispute settlement measures. The international space regime must deal with these same issues.”91 UNCLOS describes, in detail, how one can obtain exclusive rights to resources on the ocean’s floor. The treaty makes the International Seabed Authority (ISA) the trustee for those resources and can grant exclusive rights to those who meet the necessary criteria: technical capability, available funding, and details on the location and amount of resources to be mined.92 The exclusive rights granted by the Authority do not last forever; right holders have a specific time frame given to mine the resources.93 Further, if the government or entity fails to exploit the resources in a timely manner, they lose those rights.94 This is similar to the logic used by the ITU in granting GEO positions, where no one nation is granted ownership, only a temporary license to use a specific space. Granting exclusive, temporary rights to physical plots on a body in outer space, as with the ITU, would not violate Article II of the Outer Space Treaty.

International Authority CP – Solvency

An international authority modeled on the law of the sea ensures peaceful extraction of resources

Brittingham 10 (Byron, teaches Business and Law courses in various countries at overseas universities, Oregon Review of International Law Vol. 12.31 P. 54 JF)

UNCLOS, especially after its realpolitik redrafting, gives us an effective framework towards drafting a new Outer Space Treaty. Both treaties contain the concept of a lack of sovereignty and that resources of the deep sea and outer space are considered to be the common heritage of mankind. UNCLOS contains a detailed process by which a State or entity is granted limited access to hard-to-reach resources that can easily be adapted to the needs of outer space. The process that the drafters of UNCLOS underwent to gain global acceptance of the Convention shows us a way towards forming an internationally directed group, such as the ISA, to manage those resources that is perhaps less than entirely idealistic, but can gain the support of most, if not all, of the world’s nations. When all is said and done, one can hardly consider an agreement that does not acknowledge the contributions of those nations at the forefront of space exploration and give them,or their corresponding corporations,every reassurance that resources garnered from space and returned to Earth can be traded freely in the world market for the benefit of all the nations of the world.

International Authority CP – Solvency

International cooperation is key

Moltz 10(James, Astropolitics writer, 12-6, <http://www.tandfonline.com/doi/full/10.1080/14777622.2010.522935>, 7-7-11, SRF)

The tremendous work involved in bringing to completion the Obama Administration's space policy after 17 months in office—amid the welter of bureaucratic in-fighting involved—highlights the even greater challenges of developing a workable U.S. space strategy. For strategy development, there would have to be a serious study of the challenges we face in space, the range of resources we possess—national, allied, and friendly—and the likely reaction of potential adversaries. It must also offer a vision capable of rallying national and international support behind a set of practical priorities, such as settlement of the Moon or Mars, developing energy sources from space, or creating a shared response plan for dangerous near Earth objects, as well as more general philosophical goals, like freedom of access, service to Earth as a priority, or creation of an ever-expanding league of cooperating spacefaring countries. Given the extra-territorial nature of space itself and the increasingly international complexion of space activity, with the exception of the military sector, an old-style national strategy seems to be an overly limited approach. It is also not likely to succeed. Crafting an international strategy, however, requires agreeing to certain constraints on national sovereignty with the assumption of greater individual and collective gains. To date, such agreements have been difficult—but not impossible—to establish. The next set of robotic and manned lunar mission might offer test cases of such comparative strategies. Whether the problems of tomorrow in space might actually require such cooperation is a question worth asking. In the military sector, the growth of international responses to disasters, and of at least, coalition-based responses to security threats suggest that multilateral approaches may become more acceptable and desirable in the future. Such trends and the underlying reasons for supporting them (if such a decision is made) would need to be incorporated into a future space strategy.

International agreements are key to resolve ownership disputes

Popular Science 11 (1-19, <http://www.popsci.com/science/article/2011-01/moon-miners-would-need-good-lawyers-shore-extracted-resources>, 7-8-11, SRF)

The Moon Treaty of 1979 was intended to govern how the moon’s resources would be used, Space.com reports. But none of the spacefaring nations has signed it, rendering it moot. This leaves countries to rely on the Outer Space Treaty, and because it doesn’t explicitly ban resource extraction, it can probably be interpreted to mean it’s allowed. Still, this doesn’t address who owns the title to the materials. On this planet, when you mine for precious resources, you’d want to make sure you own them after you take them out of the ground, because then you can sell them. Figuring this out will probably require legislation or international agreements, according to Space.com. And a nice payday for space lawyers. Hey, what do you call 5,000 lawyers sent to the moon? A good start!

International Authority CP – Solves Conflict

CP Solves- unilateral lunar mining without a legal regime causes conflict and prevents investment

Bilder 9 (Richard, Emeritus Prof of Law @ U of Wisconsin, “A Legal Regime for the Mining of Helium-3 on the Moon: U.S. Policy Options” Pg. 4-5 JF)

While the technological and economic feasibility of fusion-based nuclear energy – and particularly fusion reactors utilizing He-3 as fuel – is still uncertain and contested, and its commercial realization at best decades away, the implications of such a development could be far-reaching and profound. Fusion energy could significantly reduce the world’s heavy dependence on fossil fuels, with their accompanying problems of environmental pollution, the emission of greenhouse gases, and global warming – not to mention their rising price and role in recurrent geopolitical and economic tensions. Fusion energy could also provide a safer alternative to many countries’ growing reliance on energy from nuclear fission reactors, with their dangers of nuclear accidents and terrorism, weapons proliferation, and radioactive waste disposal. And, in contrast to the threat of depletion of terrestrial fossil fuels, it is estimated that there is sufficient He-3 present on the Moon to meet humanity’s rapidly growing energy needs for many centuries to come. Thus, it is not surprising that, despite the problematic future of He-3-based fusion energy, the United States and other major powers are beginning to position themselves so as to ensure their future access to lunar He-3 resources. However, this growing interest in lunar He-3 poses its own problems. As yet, there is no international consensus on whether, or how, any nation or private entity can exploit or acquire title to lunar resources. The UN-developed 1967 Outer Space Treaty4 does not specifically address this question. While a related UN-sponsored 1979 Moon Agreement5 (frequently referred to as “the Moon Treaty”) purports to lay the groundwork for the eventual establishment of a regime for the exploitation of lunar resources, that agreement has thus far been ratified by only a very few countries – not including the U.S. and none of which are currently leading space powers. Absent an agreed international legal framework, attempts by the United States or any other nation or private entity to acquire and bring to Earth significant quantities of He-3 could give rise to controversy and conflict. Indeed, without the security of an established legal regime, nations or private entities might well be reluctant to commit the very substantial money, effort and resources necessary to mine, process and transport back to Earth the amounts of lunar He-3 sufficient to support the broad-scale terrestrial development of He-3-based fusion energy.

International cooperation is crucial to solve-transnational ties are powerful in space

Moltz 10(James, Astropolitics writer, 12-6, <http://www.tandfonline.com/doi/full/10.1080/14777622.2010.522935>, 7-7-11, SRF)

Notably, in the United States policy community, one hears the lament: "if only we had a strategy" for space. There is too often, however, a facile assumption that having any U.S. strategy for space is better than having none. This article argues that such "conventional wisdom" is misleading. While current U.S. disorder and a lack of space priorities are both serious problems, choosing a national strategy for space that is too costly relative to other national goals, causes harmful reactions by others, or that relies on premature concepts or technologies could be equally, if not more, damaging to U.S. national interests in space. This article suggests instead that we must first develop a more thorough understanding of the real requirements for an effective space strategy. Only then can we move forward with confidence toward crafting one. Fortunately, in the process of doing so, we are likely to "think smarter" about space, even in the absence of a fully elaborated strategy. A key point that this essay develops is the notion that, given emerging international trends in space, adopting a purely national strategy will become increasingly difficult and counterproductive. Specifically, with the growing importance of international cooperation in space for reducing costs and dealing with shared problems in this highly interdependent environment, alliances, networks, and transnational ties may become the true test of a state's "power" in space, rather than, as in the past, only its own national assets. In this sense, effective leadership in space coalition building and compatibility with other countries' goals may become critical to the success of any future national strategy. Finally, serious thinking about cause-and-effect relationships and action-reaction dynamics cannot be ignored. Too often, purported strategists make the mistake of adopting simplistic assumptions of "decisive" U.S. moves and static foreign reactions. Such thinking is unrealistic, and it will cause us to fail in anticipating the actual future of space activity. Indeed, given the global spread of space technology, the complex dynamics of international interactions are likely to become even more important as we move further from the bipolar U.S.-Russian context and into a new multipolar space structure, influenced by additional actors, such as China, the European Space Agency and European Union, Japan, India, and others.

International Authority CP – Solves Conflict

Only international legal cooperation can prevent impending conflict on the Moon

Hatch 10 (Benjamin, Editor at Emory International Law Review, <http://www.law.emory.edu/fileadmin/journals/eilr/24/24.1/Hatch.pdf>, 7-7-11, SRF)

All of the leading world powers, and those states which aspire to enter "great power" status, are interested in the Moon. Given the American rejection of proposed Russian cooperation and the statements by the Indian military chief of staff, it is clear that the controversial theories about Helium-3 and fusion are leading to a global space race, with at least the head of the Chinese lunar program convinced that the first one there will win the prize.111 Yet, getting to the Moon is just the first step. As one article has put it, there will be a lunar land grab.112 With as many as five or six players, the Moon has the potential to be the battleground for the next "Great Game."113 As in any other game, there need to be mutually agreed upon rules that will guide players' conduct. The only problem is that the current body of law that regulates outer space is ill-suited to provide a functional set of rules for the disposition of the Moon, as Part II will demonstrate.

Creating a new space treaty is the only way to solve the aff by preventing conflict, making the aff economically efficient, preserving I-law, and boosting international relations.

Hatch 10(Benjamin, Editor at Emory International Law Review, <http://www.law.emory.edu/fileadmin/journals/eilr/24/24.1/Hatch.pdf>, 7-7-11, SRF)

A return of humans to the Moon and a harnessing of lunar resources is becoming a reality. The current legal framework is both economically inefficient and insufficiently clear to guide spacefaring states in their interactions on the Moon. New institutions are needed, and given the timetable that the spacefaring states have provided for their return to the Moon, the world should turn its attention to this issue now. By proactively creating a new legal framework for the Moon, and outer space generally, potential economic opponents will be forced to reevaluate their own interests and to listen to the concerns of other states. Regardless of whether the solution created resembles the Lunar Forum, the Madrid Protocol, or some middle ground, it is of paramount importance that states begin and participate in a dialogue about the future of the Moon and its resources. This dialogue will lead to greater mutual understanding and reduce the chance of international conflict on the Moon. Even if Helium-3 fusion ultimately does not become a solution to the world's energy problems, states will be none-the-worse for having come together, discussed energy economics, and worked out a mutually agreeable solution. If, on the other hand, it does prove to be a successful energy source, the risks of allowing the OST and Moon Agreement to remain the official international law of lunar resources are too great. It is better to be safe and wind up with another common-space regime that exists only on paper than to be sorry and see the world reduced to conflict over Helium-3. Creating a new treaty through open dialogue will lead not only toa new trend in more efficient commons-resource management but also to greater respect for international law and other states as the world faces the challenges of the next century.

International Authority CP – Solves Conflict+I-Law

International cooperation solves conflict and doesn’t break I-law

Moltz 10(James, Astropolitics writer, 12-6, <http://www.tandfonline.com/doi/full/10.1080/14777622.2010.522935>, 7-7-11, SRF)

Second, a space strategy would have to consider the likely reaction of other space actors. It is unfathomable that other countries in the future will not watch what the United States does in space. As the leading space power today, all countries are likely to compare their efforts to those of the United States and, for rivals, to try to meet what they consider emerging space threats. As Waltz argues, “great powers always counter the weapons of other great powers, usually by imitating those who have introduced new weapons.” 51 This raises the risks of U.S., Chinese, Indian, or other efforts to field space weapons and attempts to obtain a “dominance” position through offensive and defensive military means. Instead, any serious space strategy must take into account this “demonstration effect” and try to minimize negative foreign reactions through communication. As Johnson-Freese observes: “Strategic communication is the intersection between rhetoric, policy, action, and politics. It is an inherently difficult and messy business.” 52 Yet, she also notes that it is also very important and should include a “listening” component. 53 The 2006 U.S. National Space Policy advertised a hostile message to the world of conflicts the United States foresaw in space and, to some degree, advertised U.S. “space control” capabilities, some of which we likely do not yet possess. The impact on foreign militaries was likely to stimulate their own efforts to acquire such capabilities. The 2010 National Space Policy recognizes the international dimension of space activity as a central feature of future planning and calls for engagement with other actors, both governmental and commercial. In addition, space activity includes increasing role for the public, which is connected to space information via the Internet and other tools that did not exist in previous eras. Enthusiasts who watch space by private means—either physically or electronically—will matter in how outcomes evolve in space, as China found out when such individuals first made its anti-satellite (ASAT) test public in January 2007, after they noticed a Chinese weather satellite was “missing” from orbital data available on the Internet. Thus, we need to think carefully about how we communicate ideas about space to others, and the fact, that space information itself is more difficult to control than in the past. The point is people—not only governments—watching. This underlines the importance of developing an effective U.S. “vision” for space. If it is a forecast of inevitable space warfare, people and their governments are likely to prepare accordingly; if it is a commercially oriented realm, we may see entrepreneurial ideas emerging, as well as new competition; if it is as an environment ruled by legal mechanisms and considered as a protected “global commons,” other countries may be more likely to use international law to promote their self-interests; and if it is more of a science-driven concept, it may stimulate new ideas for exploration and monitoring of space and a focus on cooperative missions. Of course, none of these individual strategies is likely to be all-inclusive. To assist in any effort, increased transparency and dialogue—to sort out the best frameworks—could be useful tools for sending a message and building a new community of like-minded actors. Using new technologies to build a global space situational awareness network could play an important role in supporting such efforts.

International Authority CP – Solves I-Law

Inequality between developed and developing nations undermines international law and causes instability

Larschan and Brennan 83 (Bradley and Bonnie, Fletcher School of Law and Diplomacy, Columbia Journal of Transnational Law Vol. 21.305 P. 336-337 JF)

International law cannot survive as a coherent force in the regulation of man’s activities when there is more than one set of rules. Nor can one argue that a new binding legal principle has emerged by virtue of fiat in the General Assembly, or by the declarations of one side at the bargaining table. Legitimacy would be lost to convenience. In such an environment, “might” would ultimately replace “right.” Considering the lack of a viable alternative at present, the principle of consent must survive. The developing countries must recognize that change should be made incrementally and that the international legal system must be allowed time to absorb change.For this reason, they cannot use consensus declarations in forums such as the United Nations as pronouncements of law; if they do so, the developed states will withdraw support from these valuable forums to the detriment of the entire international system. On the other hand, developed states must be flexible and willing to compromise, even when compromise is not dictated by the present balance of military, political, or economic power. The concerns of the Third World must be respected by the developed states if the current legal framework, which has taken centuries to develop into its present, fragile state of utility, is to survive. Industrialized states must take seriously the developing countries’ claim that the gap between rich and poor nations will widen if the benefits of space, the deep seabed and the Antarctic are not shared, thereby furthering instability, creating uncertainty, and defeating the purpose of international law.

Stable I-Law for lunar exploitation is key to international order

Miller and Coit 8 (Joseph and David, Worcester Polytechnic Institute, “Lunar Property and Mining Rights” May 26 Pg. 19 JF)

The moon, as a likely mining colony and other economic destination for space-capable nations, must have explicit land laws set in place for there to be international order. Currently, the OST has some rules that provide some guidelines; but, one is probably misguided and unenforceable and others are likely to be too vague or, as some clauses are, simply lacking in substance. The laws pertinent to lunar land and mining rights in the OST are the controversial ones that are problematic and each have their respective problems.

International Authority CP – Solves Env

International coop solves environmental sustainability and resource ownership issues

Moltz 10(James, Astropolitics writer, 12-6, <http://www.tandfonline.com/doi/full/10.1080/14777622.2010.522935>, 7-7-11, SRF)

Fourth, any long-term space strategy has to consider the notion of environmental sustainability. While space is immense, the critical areas of greatest interest to us in the short-term are rather limited, and these include near Earth space, low and medium Earth orbits, geostationary orbit, the Moon, and Mars. Our use of some of these areas of space is currently running into problems due to the growth of demand. The geostationary orbital belt is becoming crowded and faces future limitations, the expansion of orbital debris is beginning to put assets in low Earth orbit at risk, radio spectrum crowding is creating conflicts over broadcast frequencies, and planned missions to the Moon are raising questions of who should have access to the most desirable locations for resource use. For all of these reasons, a workable space strategy will have to take into account the need to manage these resources and figure out a way to deal with increasing international use of them. Unless the strategy is one of attempted dominance, which is likely to be plagued by high costs and limiting technical factors, some cooperative legal or treaty-based framework to deal with these issues will likely be desirable. While a few mechanisms are currently in place, such as the International Telecommunications Union and the United Nations Debris Mitigation Guidelines, they are already stretching toward their limits and are unlikely to be able to manage future problems alone. The creation of an international space organization, as suggested by Wolter, to handle a range of such questions is another option, but that will take a change in thinking among major spacefaring countries and adequate financial support for its formation and maintenance. A “consultative space council” comprised of the various, leading national space agencies may be a more feasible option. As shared challenges to space security become more pressing, support for such a body may well increase.

International Authority CP – AT: Dolman

Dolman is wrong-he assumes continued state dominance and ignores globalization, and his historical analogies are bankrupt

Moltz 10(James, Astropolitics writer, 12-6, <http://www.tandfonline.com/doi/full/10.1080/14777622.2010.522935>, 7-7-11, SRF)

Dolman foresees a conflict among nations as inevitable in space, and therefore, believes the United States should immediately seize the initiative to achieve dominance in this new environment. As he writes: “As the great liberal democracy of its time, the United States is preferentially endowed to guide the whole of humanity into space, to police any misuse of that realm, and to ensure an equitable division of its spoils.” 35 The problem, of course, is the lack of an international consensus on this matter, including among countries with the potential means to prevent it. Dolman also assumes the continued dominance of state-led activities in space, implicitly rejecting economic globalization and the role of transnational commercial, scientific, and defense-related entities. Since his focus is largely on national security, this is not surprising, but it does limit his argument's thoroughness and generalizability. The recent expansion of major cooperative projects, such as the ISS, and the development of multinational space consortia, companies, and enterprises suggest that sovereignty in space may not be as rigidly nationalistic or its business environment as mercantilistic as these were during the days of European great powers, which Dolman often draws upon. All of these factors make it difficult to formulate a convincing space strategy, as his military prescriptions fail to take into account possible international reactions. Moreover, the costs of pursuing space dominance are not factored into the discussion, which remains at a highly theoretical level.

International Authority CP – Avoids Politics

International agreement prevents space conflict and is more popular with Congress

The Space Review 9 (11-23, <http://www.thespacereview.com/article/1512/1>, 7-8-11, SRF)

The international community must recognize that the OST did its job: it prevented the United States and the Soviet Union from turning space into another battleground. It’s time to continue that work while taking into account today’s realities. Such an effort to selectively relax this treaty is a major undertaking, and most of the world will point out that it will, at least initially, serve the interests of perhaps half a dozen countries. If the door is opened on a new OST, the effort twill have to similarly all encompassing so that all nations will have a reason to throw their support behind it. The 1960s was a magic era for space exploration, and the best explanation for why it occurred is that President Kennedy, in proposing to land a man on the Moon, really plucked a decade from the 21st century and dropped it into the now. Mankind can do the same thing again. A grand stroke that would excite and unite people would be to take a page from Star Trek and create the Federation of Space Faring Nations, a united federation devoted to the peaceful exploration and colonization of space. Any member of the Federation would have to offer to sell their space technology to any other member. Member nations would have to agree to strict nonproliferation terms and other nonaggression clauses. Part of the creation of this Federation would be a legal mechanism to selectively and progressively allow private ownership of land outside of Earth. The Federation would choose where to allow private ownership in stages, starting with the Moon and Phobos. First person there gets their forty acres, you bring your own mule. Of course, the plot would have to be continuously manned for some length of time, say five years, and every member nation would have to establish at least one outpost. Politically, it works on several levels for the Obama Administration. It allows the US to use its space technology as a lure to pull other nations into its designs for nonproliferation and technology transfer, while providing cover for Congress to financially support America’s space effort. Governments and corporations would give space serious consideration, ascertain parts of the solar system could be worth quite a lot in the future and they wouldn’t want to be left out. America’s corporate aerospace industry would benefit handsomely as it begins to build machines that allow anyone to claim their parcel in space. Finally, the profit motive would function fully in space, and we would be in awe of how quickly humanity would spread in the bodies opened up by the Federation. Hope would be handed to a new generation because a powerful new mechanism will be built to prevent global conflict while opening up a new frontier—not only in their imaginations but in reality as well.

He-3 Mining breaks I-Law

The aff breaks the OST-it must create an international organization controlled by a majority of nations to do the plan

Bilder 9 (Richard, Prof. Law @U of Wisconsin-Madison, <http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=2180&context=ilj>, 7-6-11, SRF)

Debate as to whether the United States should join the Moon Agreement and as to the agreement's potential implications for the development of lunar resources has centered on several issues.78 One question concerns the effect of the provision in article 11(1) that "the Moon and its natural resources are the common heritage of mankind."79 As indicated, opponents of U.S. participation in the agreement suggest that, as a result of the UNCLOS-3 negotiations and part XI of the LOSC, the phrase "common heritage of mankind" has taken on a fixed meaning in international law to refer to resources that are not subject to direct national or private exploitation but can rather only be legally appropriated under the aegis of an international organization controlled by a majority of nations—in effect, by the bloc of developing nations, which are the most numerous.80 In their view, the phrase reflects a particular economic and political philosophy that would likely limit the role of the United States and bar, or at least constrain, any significant role for the United States or private enterprise in the exploitation of lunar resources.81

The OST is legally binding on creation of lunar stations-disobeying breaks emerging customary lunar law

Bilder 9 (Richard, Prof. Law @U of Wisconsin-Madison, <http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=2180&context=ilj>, 7-6-11, SRF)

But this conclusion may be too cavalier. First, as indicated, the Moon Agreement arguably constitutes a reinforcement, spelling-out, or agreed interpretation by the space powers and many other concerned states participating in the COPUOS negotiations of a number of principles and obligations already contained or implicit in the Outer Space Treaty—which is already legally binding on parties to that treaty.100 Second, the agreement reflects a long and careful process of negotiation and accommodation in COPUOS between the states primarily concerned with outer space and lunar activities as to the most sensible and viable rules for the conduct of activities on the Moon. In particular, the agreement's uncontroversial provisions, such as those regarding the establishment of stations,101 conduct of scientific research,102 concern for environmental protection,108 obligations of noninterference,104 notice and consultation,105 and so forth can be argued to evidence, at least as to these matters, an emerging body of customary lunar law. Thus, the Moon Agreement will almost certainly play some role and have to be taken into account in any further discussions concerning the development of a lunar mining regime.

The OST and other documents prohibit one nation benefiting from the moon

Hatch 10 (Benjamin, Editor at Emory International Law Review, <http://www.law.emory.edu/fileadmin/journals/eilr/24/24.1/Hatch.pdf>, 7-7-11, SRF)

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial 128 Bodies ("OST") has been described as "the Magna Carta of international space law."1"" The OST may be the most important document governing the international law of outer space, but it was not the first such document. The Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space130 was a General Assembly resolution that proclaimed international standards of conduct in outer space. It would also become the basis for several of the provisions of the OST. The Declaration articulated the notion that "[t]he exploration and use of outer space shall be carried on for the benefit . . . of all mankind"131 and that "[o]uter space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." " The Declaration also mandated that states respect the "corresponding interests of other States"133 in situations where two states could find that their agendas conflict.

He-3 Mining Breaks I-Law

The plan breaks the Outer Space Treaty which is key to prevent conflict and economic problems

Hatch 10(Benjamin, Editor at Emory International Law Review, <http://www.law.emory.edu/fileadmin/journals/eilr/24/24.1/Hatch.pdf>, 7-6-11, SRF)

The Common Heritage of Mankind Doctrine ("Common Heritage Doctrine") is a favorite vehicle of developing states to delay economic exploitation of common spaces indefinitely on the logic that it is better for no state to harvest and appropriate commons resources than for only developed states to be permitted to do so. The Common Heritage Doctrine refers to five principles: (I) the area is not subject to national appropriation; (2) all states share in the management of the area; (3) the benefits derived from exploitation of resources in the area must be shared with all regardless of the level of participation; (4) the area must be dedicated to peaceful purposes; and (5) the area must be preserved for future generations.1 While the phrase "common heritage of mankind" is found in the generally rejected Moon Agreement, but not explicitly in the OS'!\*, textual support can be found in the OST for each of the five Common Heritage Doctrine propositions.191 The problem is that it is a very expensive proposition to develop any space program, particularly one capable of harvesting and transporting natural resources from a celestial body.192 Taken seriously, applying the Common Heritage Doctrine would impose a requirement that one country expend massive amounts of money to reach the Moon, and then be a proprietary interest in lunar resource reserves. Furthermore, it would be obligated to allow other states to share equally in the management of, and benefits derived from, the area. In other words, the Common Heritage Doctrine perversely rewards free riders, as states that bear neither risk nor cost gain managerial power and benefits for free, simply because their citizens happen to share the same DNA with the citizens of the state(s) that made the investment. The result is predictable—no state wants to bear the high cost of developing its space program to confer equal benefits on free riders, and so up to now, no state has bothered to create plans to economically exploit the Moon. While the current planning for new expeditions to the Moon could suggest that states have decided to bite the bullet and reluctantly participate in the common heritage scheme, the current rhetoric of conquest, and the American refusal to participate with the Russians on their Moon base, seems equally suggestive that states are willing to reject the text of the OST (or creatively interpret the words until they lose their meaning) and effectively claim proprietary interests on the Moon. A refusal to follow international law1 would set a terrible precedent and would further weaken an already failed legal regime. To remedy the economic problem of the reversed tragedy of the commons, and to preempt many of the conflicts that will naturally arise in the coming lunar expeditions, a new body of law is necessary to regulate the natural resources of the Moon.

Mining helium-3 breaks the OST, multinational ownership prevents failure through conflict

Moltz 9(James, associate prof. of National Security Affairs @Naval Postgraduate School in Monterey, Fall, <http://www.au.af.mil/au/ssq/2009/Fall/moltz.pdf>, 7-6-11, SRF)

As technology advanced in the late 1990s and global tensions eased following the Soviet Unions demise, another "rake" on the moon's settlement emerged from Artemis Society\*9 member and chief executive of the so-called Lunar Development Corporation Oregon' Bennett—one led by space tourism. 0 The concept outlined the initial reestablishment of human exploration on the moon via privately funded tourism, which would create the necessary life-support infrastructure. While most analysts focused on industrial enterprises—like the mining of helium-3—Bennett argued provocatively, "I'd rather see it developed like Honolulu." Such a scenario ruled out national competition as the primary motivation, focusing instead on profit and "fun."'1 However, such notions challenged the Outer Space Treaty (given its lack of specific mechanisms for allotting lunar locations) and rejected the Antarctic model outright, possibly sowing the seeds for at least commercial conflict. Today, whether the tourism industry will lead the process of lunar settlement still remains to be seen, although a few private organizations supporting moon development (such as the Netherlands-based LUNEX group) have already crafted elaborate scenarios around this possibility. The question raised by realist theory is whether military forces might eventually be required to "defend" such commercial assets. Such future pressures, on the other hand, might be mitigated by multinational ownership or at least financing of such ventures, which is likely.

He-3 Mining Breaks I-Law – Backlash

Unilateral action fails-international backlash

Bilder 9 (Richard, Prof. Law @U of Wisconsin-Madison, <http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=2180&context=ilj>, 7-6-11, SRF)

However, even if the United States could "go it alone" in this way, there are reasons why it may not wish to do so. First, neither the U.S. government nor U.S. private enterprise is likely to be willing to risk the very substantial investment and long-term effort necessarily involved in seeking to develop He-3-based fusion energy without some assurance that—assuming the very difficult technical and engineering obstacles to developing efficient fusion reactors and establishing permanent moon bases can be overcome—the requisite supply of lunar He-3 can continue to be obtained without encountering significant legal or political difficulties. Whatever may be the most legally persuasive interpretation of existing international law, other nations or people on Earth may challenge the unilateral appropriation of lunar resources by the United States, especially of a potentially uniquely valuable resource such as He-3. This, certainly, was the international experience in the 1960's when developing nations vigorously protested the prospect that a few technologically-advanced countries and their private enterprises might alone appropriate what was at the time assumed to be the mineral riches of the deep seabed. That perception ultimately led to the enunciation of the "common heritage" doctrine, the convening of UNCLOS-3, and the adoption of part XI of the 1982 LOSC.118 Only a broadly accepted international agreement is likely to offer the continued legal and political predictability that is essential if a long-term He-3-based fusion energy program is to be undertaken and sustained."9

Unilateral attempts at mining fail-only an international legal regime can solve

Bilder 9 (Richard, Prof. Law @U of Wisconsin-Madison, 10-8, http://www.law.wisc.edu/m/wndnj/bilder1489273mining\_helium-3ftns.pdf, 7-6-11, SRF)

However, neither nations nor private commercial enterprises are likely to be willing to commit resources to an He-3-based fusion energy program absent a stable and predictable legal regime governing lunar resources that provides reasonable assurance that any such effort and investment will be rewarded and can be carried on without controversy or disruption. Yet, at present, international space law fails to establish any detailed rules governing the mining, ownership and exploitation of He-3and other lunar resources or to provide such assurance. Consequently, if the U.S. seriously contemplates the possible development of He-3-based fusion energy, it is in its national interest to take steps to establish what it would consider as an acceptable and agreed-upon international lunar resource regime - and to do so relatively soon.

Aff – International Authority CP – LOST Bad

Modeling of the law of the sea fails—the common heritage principle disincentivizes development and harms property rights

Dalton 10(Taylor, J.D. LL.M from Cornell Law, “Developing The Final Frontier: Property Rights on Celestial Bodies for the Benefit of All Mankind” P. 21-22 JF)

On a basic level, the law of the sea and the Antarctic treaty system are an inadequate analogies to the outer space legal system because they ultimately fail to properly balance the interests of the global community with the need for private property rights. Generally, space law has been treated differently than other types of international law, and an analogy to it most likely needs to be substantially reworked to fit the context and special character of space law.107 The tension between incentivizing the private development and protecting the interests of humanity continues to pose problems in both regimes. The drafters of both understood the tension and attempted to find a middle ground, but both have instituted measures that are too pro-community, at the expense of development. The high seas regime comes closest to the type of scenario in the outer space context, but it fails to properly balance incentives to develop with community interests. The law of the sea deals primarily with the extraction of resources and the ownership of those resources, but provides that those who invest in the extraction of those resources must pay out to those that did not invest in a misguided attempt to uphold the principle of the benefit for all humanity. The system of redistribution of the wealth that is acquired from the seabed is not an appropriate solution because it harms the incentive to develop. In addition, the transaction costs and practicality of the entire regime make it untenable—which it in fact is. It also focuses on national sovereignty, i.e. dividing up territory. Although Rosanna Sattler’s proposal to transfer the concept of the EEZ to the outer space regime is appealing, it ultimately fails to deal with the underlying issue. One serious question she fails to address is how the EEZs would be apportioned on a celestial body? There is no national “baseline” or starting point by which to measure the EEZ from. However, fixtures or structures that have become immoveables on the celestial body might serve as a starting point. Another inadequacy in this analogy is that the status of natural resources in the law of the sea context is conceptually different than the status of natural resources in space law. The main difference is in the weight carried by the common heritage of all mankind principle. The common heritage principle is conceived of in general terms in the Moon Treaty; and the legal regime implementing it was not developed.108 UNCLOS is very detailed in its explanation of the common heritage principles and procedures. This can be explained by the strong bargaining power of the developing countries in the UNCLOS process, and the relatively immanency of actual seabed exploitation.109 Art. II.7 of the Moon Treaty equates the special consideration of the “interests and needs of developing countries” to the efforts of those countries which have contributed to the exploration of the Moon, namely developed nations. The common heritage principle implementation criteria of the Moon Treaty in Art. 11.7 are meant to distinguish it from that of the law of the sea context.110

Aff – International Authority CP – AT: I-Law

I-law doesn’t matter, nobody will challenge the US and it can create its own legal regime

Bilder 9 (Richard, Prof. Law @U of Wisconsin-Madison, <http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=2180&context=ilj>, 7-7-11, SRF)

As indicated, there does not at present appear to be any legal barrier to the United States engaging in lunar mining, save for the very general limitations imposed by the Outer Space Treaty and broader international law.113 Moreover, as a practical matter, no other nation is likely in the near future to be in a position to prevent the United States from establishing a lunar base and conducting activities on the Moon as it wishes.114 Consequently, the United States could presumably proceed with an He-3-based fusion energy program on the assumption that it could mine and bring to Earth lunar He-3 without any need for seeking further international approval. Under this approach, the United States could develop an appropriate legal regime of its own, consistent with its own needs and principles, rather than having to reach compromises with other countries. There is precedent for unilateral U.S. action of this kind—the 1980 United Slates Deep Seabed Hard Mineral Resources Act,115 which, following U.S. rejection of the 1982 LOSC, continues to govern the commercial recovery of deep seabed minerals by U.S. companies.116 Subsequent to its enactment, the United States concluded international agreements with several other states in 1982 and 1984 (Belgium, France, Germany, Italy, Japan, the Netherlands, and the United Kingdom) to resolve overlapping claims with respect to mining areas for polymetallic nodules of the deep seabed. 117

\*\*\*Gas Planets CP\*\*\*

Gas Planets CP – 1NC

Counterplan Text: The United States Federal Government should support and fund helium-3 mining in Jovian planets’ atmospheres.

Jovian mining solves better for Helium-3 mining than the Moon – gives us 91 billion years of helium-3 resources

Ashworth 10(Stephen, Oxford,12-10, http://www.astronist.demon.co.uk/space-age/essays/sa22.html#e, accessed 7-6, JG)

Let us assume that John Lewis’s figure for the helium-3 resource of Uranus is accurate (i.e. that atmospheric mixing is only efficient down to a depth where the pressure is 12 atmospheres), and that the resources of the other giants are in proportion with their masses. Then the energy reserves in the atmospheric helium-3 of the giant planets, expressed in years at the present-day rate of use, are as follows: Jupiter: mass 318 Earth masses, estimated helium-3 resource 350 trillion tonnes, equivalent to 65 billion years; Saturn: mass 95 Earth masses, estimated helium-3 resource 104 trillion tonnes, equivalent to 19 billion years; Uranus: mass 14.6 Earth masses, estimated helium-3 resource 16 trillion tonnes, equivalent to 3 billion years; Neptune, mass 17.2 Earth masses, estimated helium-3 resource 19 trillion tonnes, equivalent to 3.5 billion years. On the subject of mining helium-3 on the Moon, see John Lewis, p.137-41, for reasons why this is unlikely to become practical. Basically, the concentration of helium-3 absorbed into the lunar regolith is expected to be about one part in 100 million, whereas its concentration in the atmospheres of the giant planets seems to be about one part in 100,000, or 1000 times greater. Lunar regolith, being solid, is very much harder to work than atmospheric gases. A lunar helium-3 mine would consume large amounts of electrical power, and also require constant maintenance. The energy advantage of extracting helium-3 is little greater than that of devoting the same effort to collecting solar power and using it directly, with the difference that the helium-3 is a non-renewable resource whereas solar power will continue for billions of years to come. The helium-3 sources of choice are therefore, in Lewis’s view, the atmospheres of the outer giants, starting with Uranus.

We avoid the spending link– its economically acceptable compared to lunar mining

Kammash & Tang 10 (T. & R., Joint Propulsion @ University of Michigan, 6-12, http://deepblue.lib.umich.edu/bitstream/2027.42/77211/1/AIAA-2006-4394-194.pdf, accessed 7-7, JG)

This may include, for example, mining Helium-3 on Jupiter whose atmosphere is known to contain He3 to the tune of 350 trillion tons compared to the much smaller amount in the lunar regolith. Since He 3 is a desirable fuel for terrestrial fusion power reactors but virtually non-existent on Earth, and much more readily extractable from the atmosphere than from the solid regolith, we address in this paper a bi-modal fusion system that uses D-He 3 fuel cycle and assess its capability for transportation to and mining of a planet such as Jupiter. It has been estimated 1 that one ton of He 3 in combination with 2/3 ton of deuterium burned in a fusion reactor at an efficiency of about 10% will produce about 1.85 GW year of energy. If the annual global industrial energy consumption of 10 4 GW year is further assumed, then that is the equivalent of the use of 5400 tons of He 3 in fusion reactors. Moreover, it has also been pointed out that the energy value of He 3 in today’s dollars is approximately $9×10 ^6 per kilogram when compared to the value and energy potential of oil. This suggests that securing He 3 in large amounts even from distant planets such as Jupiter or Uranus might be economically acceptable.

Gas Planets CP – Impact – Interstellar Travel

Mining leads to spin off exploratory methods – propels us into interstellar travel

**Aerospace America 7** (Air & Space Review, December, http://www.hpcc-space.de/publications/documents/AerospaceAmerica.pdf, accessed 7-6, JG)

Outer planet atmospheric mining New research insights regarding atmospheric mining of the outer solar system were developed at NASA Glenn. Four major options for the mining of Uranus and Neptune for helium 3 and hydrogen fuels were assessed, and the masses of the required vehicle were estimated. Balloons, hypersonic scoopers, and two types of atmospheric cruisers (or aerospace craft) were investigated. The cruiser options were found to be most successful. While balloons may be a viable option for short-lived mining, cruisers will likely have a considerably longer lifetime and afford a lower total mass for the overall mining system. Using a combination of a cruiser, an orbital transfer vehicle, and a fuel storage facility integrated into an interplanetary transfer vehicle, the fuels could be wrested from the gas giant planets. Understanding the lifetime issues of a cruiser aerospace craft in the 70-K temperature environment of Uranus and Neptune will re-quire much additional research. In all cases, atmospheric mining of the outer planets will require a number of spacecraft and many complex maneuvers to wrest fuels from their powerful gravity wells. Cruisers, balloons, and scoopers each entail different mining scenarios. Cruisers have the advantage of operating in the atmosphere at subsonic speeds, which would ease the liquefaction requirements for mining. Also, the stresses on the vehicle seem the most benign of all of the mining vehicles. The cruiser may be most attractive for the longer-term missions. It will likely use the planetary atmosphere for fuel (for a nuclear“ air-breathing" engine), capturing and liquefying the needed gases from the atmosphere as well. The cruiser may exit the atmosphere and be refitted or resupplied (with delivery capsules, other consumables, replacement units, and so on) from orbital assets. Balloons have been proposed in the past as viable mining platforms. However, the lifetime of these systems, especially higher temperature balloons, would be a limiting factor in a balloon-bome mining scenario. Balloons are better suited to shorter life missions. Typical balloon lifetime for Earth exploration is usually in the10-100-hr range. The scooper miners, although a fascinating option, will likely be used for short and limited forays into the atmosphere. Given the complexity of the missions and the delta-V required for mining, the cruiser- and balloon-borne approaches are the most likely to be acceptable for future study. Vehicle and mission complexities associated with atmospheric mining make it a daunting task. Based on analyses of the masses of the vehicles, only very high specific impulse, high thrust, and lightweight vehicles can possibly al-low an effective strategy for such mining. Additional research is needed in lightweight cryogenic gas separation technologies and the likely lifetime of aerospace vehicles in the cryogenic environments of the outer planet atmospheres. Mining the planets will likely unlock new capabilities for exploring and exploiting the solar system. The initial steps in pursuing in-situ resource utilization will allow new visions of energy sources for Earth, solar system spacecraft, and perhaps humankind’s first step into interstellar space.

Interstellar vehicle spinoffs are guaranteed

Torre 4 (Louis, Legal Policy, 3-18, http://www.unexplainable.net/artman/publish/article\_705.shtml, accessed 7-7, JG)

Another advantage of DAEDALUS over ORION would be fuel supply. I don't know how much helium-3 is contained in the Jovian atmosphere. However, since just about everything about Jupiter is on a Brobdingnagian scale, I suspect there's quite a bit of it. In particular, there's probably enough to keep a fleet of very high capability (both in terms of speed and payload) orbital transfer vehicles (OTVs) running for as long as might be necessary or desirable. As a bonus, once the infrastructure to support such vehicles was in place, building one or more interstellar probes might become practical on a spinoff basis since the additional investment required would come down to acceptable levels.

Gas Planets CP – Impact – Asteroids

Jovian atmosphere mining leads to asteroid mining

Torre 4 (Louis, Legal Policy, 3-18, http://www.unexplainable.net/artman/publish/article\_705.shtml, accessed 7-7, JG)

Also, the propulsion concept involved would have used helium-3, which is rather rare in this neck of the solar system. It exists on Earth, but essentially only in trace amounts. There is some on the Moon, but nowhere near enough. In fact, the nearest (and perhaps only known) place where it exists in sufficient quantity is the atmosphere of Jupiter. The scenario therefore called for DAEDALUS to be built in orbit around that planet. (Just why this was preferable to building the vehicle in Earth orbit and towing it out to Jovian orbit for fueling is something I've never seen explained.) The biggest objection that I can see to DAEDALUS is that it would entail too great an investment for a single one-way space probe. However, the propulsion system concept might find other applications. For example, DAEDALUS like ORION, could represent an excellent means of moving very large payloads around the solar system relatively quickly. For example, since the fuel source is Jupiter's atmosphere, DAEDALUS might represent an excellent concept for moving mineral-rich asteroids for from the main belt to an orbit around Earth where they could be mined. (I believe it was G. Harry Stine who pointed out that a single nickel-iron asteroid, one mile in diameter would contain the equivalent of a couple of centuries of world nickel and iron production, at mid-1970s rates.)

Asteroid mining is key to sustainable society

Space Wealth 11 (asteroid mining company, “Is Profitable Asteroid Mining a Pragmatic Goal?” Pg. 3 2/23 JF)

Our space agencies need to enable a revolutionary transformation in the material culture of our home planet. They need to design and launch positive economic feedback systems that utilize off-planet resources. Space agencies need to develop the skills and knowledge required to draw material resources through extraterrestrial supply chains, and put them to use in terrestrial systems of production. Once learned, space agencies need to transfer these skills and understandings to individuals in industry. Civil space agencies also need to help design, publish, and promote the inner solar system knowledgebases that will prepare today’s students for profitable extraterrestrial careers.22 We need our civil space agencies to do these things, because we need the metals that are available in asteroid ore to support our technological societies on Earth, so that they may become ecologically sustainable over the decades and centuries to come.

Asteroid mining provides platinum for a hydrogen economy

Space Wealth 11 (asteroid mining company, “Is Profitable Asteroid Mining a Pragmatic Goal?” Pg. 4 2/23 JF)

Platinum group metals are also critical as catalysts in hydrogen fuel cells, which are key to a possible post-carbon, “hydrogen economy.”28 In 2008, The National Research Council identified PGMs as the “most critical” metals for U.S. industrial development.29 Platinum group metals are abundant in certain types of near-Earth asteroids(NEAs). NEAs that are mineralogically similar to one of the most common types of “observed fall” meteorites (H-type, ordinary chondrites) offer PGM concentrations (4.5 ppm)30 that are comparable to those found in profitable terrestrial mines (3-6 ppm).31 Other meteorites suggest that some asteroids may contain much more valuable metal.32 The PGM value of a 200 m asteroid can exceed $1 billion, or possibly $25 billion.33 Over 7,500 NEAs have been detected.34 Close to a fifth of these are easier to reach than the moon; more than a fifth of those are ≥200 m in diameter: 200+ targets.35 President Obama requested, and Congress has authorized, a fourfold increase in detection funding ($5.8 m to $20.4 m/year).36 This could lead to ~10,000 known 200 m NEAs in a decade.37 But detection is just a start. The costs to locate, extract, and process asteroid ore are not well understood.38 Before significant private capital is put at risk, we need to learn more. In cooperation with other forward looking nations,39 the U.S. should purchase an option to develop asteroid resources by investing in the knowledge required to mine asteroids. We can then choose to exercise this option if terrestrial PGM supplies do in fact collapse. Asteroids may also be able to supply other metals that are increasingly at risk.40 There are several candidates: In 2009, the U.S. imported 100% of 19 key industrial metals.41 To seek the “fullest commercial use of space,” NASA should buy down the risk of asteroid mining ventures by investing in R&D that can give us the tools to discover, analyze, and process asteroid ore, and deliver it safely to Earth, and to Earth orbit. NASA, with other space agencies, should run demonstrations for this globally important program so that, as the GAO likes to put it, useful “knowledge supplants risk over time.”42

Gas Planets CP – Spending Link Shield

It’s more economically feasible to mine the Jovian planets than the Moon

Stochastic Geometry 9 (Mathematics, 7-25, http://www.stochasticgeometry.ie/2009/07/25/moon/, accessed 7-7, JG)

And the harvesting is portrayed well, raking in the top few inches of regolith instead of tunneling into the moon, so someone at least read up on how the He3 got there in the first place; it’s just a pity that they didn’t continue to read to find out that it makes more economic sense to go to the gas giants if you’re harvesting He3 for use on Earth. And there’s even mention of a project in Jovian space in the background of the story, so the mistake is compounded by there already being an existing, far more lucrative source of He3 available in the story’s universe. The harvesters themselves are also one of the visually jarring elements – they throw their processed regolith back up and over in great plumes of material, but the arcs the material follows are the ones you see when you throw something in Earth gravity, not lunar gravity. The whole setup doesn’t behave as it would on the moon.

Gas Planets CP – AT: Mining Hard

Jupiter’s gravity is just perfect for transportation of H-3

Parkinson, No Date(R.C., http://www.daedalus-zvezdolet.narod.ru/doceng/09eng.doc, accessed 7-6, JG)

At first sight the gravity well of Jupiter seems to form a major obstacle against lifting propellant from a point within the atmosphere to a construction site In orbit. The orbital velocity of a satellite just outside the Jovian atmosphere is 42,1 km/sec. However, the natural rotation of Jupiter provides a speed of 12.7 km/sec. to a point on the equator, and in addition the low temperature and the high speed of sound in the largely hydrogen atmosphere means that the limiting point for ramjet operations due to high inlet stagnation temperatures is at about 10 km/sec. Both these factors considerably case the problems of designing an orbital ferry vehicle.

Uranus solves their defense – it is the best option for H-3 mining

Crowl 11(Adam, Project Icarus, 5-31, http://news.discovery.com/space/project-icarus-helium-3-mining-uranus-110531.html, accessed 7-6, JG)

However, there is a surprising amount of helium-3 in the gas giant planets of the outer solar system, and in the original 1978 "Project Daedalus" report Bob Parkinson suggested mining it via floating robotic factories in the atmosphere of Jupiter. Since then a different planet has moved to the forefront of gas-mining plans because it lacks Jupiter's intense gravity, Saturn's gigantic rings of orbital debris and is closer than distant Neptune. You guessed it; the best helium-3 supply in the solar system is from the "Gas Mines" of Uranus. That the planet which is the butt of so many poor jokes should be relatively rich in methane as well is purely coincidental, but as a mining site it has several advantages. The surface gravity, which is defined from the 1 bar pressure level in a gas giant's atmosphere, is 90 percent that of Earth's and the speed needed to reach low orbit is lowest of all the gas planets. Uranus's rings are also high, thin and not showering the atmosphere below with a hail of meteors, unlike Saturn's. Accessing the gas riches of Uranus will require nuclear power, however. Designs exist for nuclear powered ramjets that could fly indefinitely in the atmospheres of the gas giants -- this might prove a viable means of keeping an extraction factory aloft. Else we'll be back to using balloons like "Project Daedalus," serviced by nuclear ramjets. An atmosphere composed of a cold gas mix that is lighter than helium and not much heavier than hydrogen, means that hot-air ballooning will need to be used. That the oldest technology of flight will find a role supporting the latest, fusion propulsion, has a certain poetic justice. Getting the fuel home, where it can be used domestically as well as for tanking-up starships, could provide an early pay-off for developing a fusion propelled starship.

Jupiter & Uranus have the best chance of solving

Crowl 11 (Adam, Project Icarus, 5-31, http://crowlspace.com/?p=112, accessed 7-6, JG)

The most abundant source of Helium-3however is the atmospheres of gas giants. The two best candidates are Jupiter, which is the closest to Earth — but has very powerful and tenuous gravitational field —and Uranus — with a slightly higher Helium-3 concentration, but is almost four times further away from Earth. Team Icarus is actively researching fusion fuels and several interesting fuel acquisition methods. One option, also considered in detail by the Daedalus team, is the placement of atmospheric mining balloons in the atmospheres of gas giants, the designs for which may be informed from research into stratospheric balloons.

Mining Uranus’s atmosphere is quick and simple

ZME Science 11(Science News Online, 6-3, http://www.zmescience.com/space/harvesting-gas-from-uranus-might-power-interstellar-flight-312321/, accessed 7-6, JG)

Project Icarus is an extremely fascinating initiative, which aims to bring humanity closer to the stars. The latest theory proposed by scientists there is related to the development of system, which could allow the harvesting of helium-3 gas from Uranus to fuel a possible interstellar mission. Uranus, then, seems to be a very resourceful planet, considering scientists believe it’s covered in oceans of diamonds. Helium-3 is a great fuel for fusion power, however it’s only found in extremely limited quantities here on Earth, but there’s more than plenty on the distant planet. In fact, the gas is so efficient that only 14,000 tons of it would be enough to power the entire planet for a year. Doesn’t seem such a crazy idea, anymore, right? Also, don’t mind the title of this post. The mining process, scientists say, could be possible with the help of a robotic hot air balloon which could be filled with the gas and then float it back to Earth. The robot balloon would take 70 days to reach Uranus, and be able to take 500 tons of helium-3 at a time.

Gas Planets CP – AT – Jovian = Only Jupiter

The Jovian planets include Jupiter, Saturn, Uranus, & Neptune

Schools 9(Zack, Lynchburg, 9-29, http://www.lynchburg.edu/Documents/GovernorsSchool/2008solarsystem/Helium\_Mining\_Final\_Report.pdf, accessed 7-6, JG)

Deuterium is found on Earth in small amounts and can be processed into “heavy water.” (Used in nuclear reactors) The only problem is that He-3 does not exist anywhere on Earth and this makes “safe” fusion impossible without outside sources of Helium-3. This isotope of helium is found on the Moon, but in VERY SMALL amounts making large scale fusion processes based on exported helium from the Moon an inefficient process. The other sources of Helium-3 include the Jovian planets; Jupiter, Saturn, Uranus, and Neptune.

Gas Planets CP – AT: No Helium on Giants

The gas giants hold substantial Helium-3 reserves

Geere 11 (Duncan, Wired Staff Writier, 6-3, http://www.wired.co.uk/news/archive/2011-06/03/icarus-harvests-gas-from-uranus, accessed 7-7-, JG)

Helium-3 is an enormously useful gas for fusion reactions. It's not radioactive, and its sole high-energy by-product is a proton, which can be contained in electric and magnetic fields, resulting in direct net electricity generation. That means clean, efficient fusion power. The problem is that there isn't much helium-3 left on Earth. What there is sits deep in the mantle, trapped during the formation of the planet. There's thought to be more on the Moon, thanks to the solar wind impacting on its surface over billions of years, but the gas giants of the outer solar system are basically where the party's at if you're looking to pick up helium-3.

Gas Planets CP – AT: No Tech

We have the technology to mine the Jovian atmosphere

Photo Tend 9 (Solar Expertise, 10-20, http://www.phototend.com/solar/solar-2-368.html, accessed 7-7, JG)

1- we have the technology and vehicle to use said Helium 3 2- we have the technology to economically "mine" the Jovian atmosphere 3- that Helium 3 is indeed desirable (perhaps, by that time, we could directly fuse protium instead) 200 years ago, a heavier than air flying machine was not practical. Just over 100 years ago, it was a reality, and today, thousand of empire are flying each day.

Aff – Gas Planets CP – Perm

Perm: do both – moon mining is key to Jovian mining

Kazan 9 (Casey, Staff writer , 3-17, http://www.dailygalaxy.com/my\_weblog/2008/07/is-helium-3-exp.html, accessed 7-6, JG)

Helium 3 fusion energy - classic Buck Rogers propulsion system- may be the key to future space exploration and settlement, requiring less radioactive shielding, lightening the load. Scientists estimate there are about one million tons of helium 3 on the moon, enough to power the world for thousands of years. The equivalent of a single space shuttle load or roughly 25 tons could supply the entire United States' energy needs for a year. Thermonuclear reactors capable of processing Helium-3 would have to be built, along with major transport system to get various equipment to the Moon to process huge amounts of lunar soil and get the minerals back to Earth. With China's announcement, a new Moon-focused Space Race seems locked in place. China made its first steps in space just a few years ago, and is in the process of establishing a lunar base by 2024. NASA is currently working on a new space vehicle, Orion, which is destined to fly the U.S. astronauts to the moon in 13 years, to deploy a permanent base. Russia, the first to put a probe on the moon, plans to deploy a lunar base in 2015. A new, reusable spacecraft, called Kliper, has been earmarked for lunar flights, with the International Space Station being an essential galactic pit stop. The harvesting of Helium-3 on the could start by 2025. Our lunar mining could be but a jumping off point for Helium 3 extraction from the atmospheres of our Solar System gas giants, Saturn and Jupiter.

Aff – Gas Planets CP – Mining Hard

Jupiter & Saturn mining fail – harsh atmospheric conditions

Palaszewski 6(Bryan, Glenn Research Center @ NASA, 11-22, http://gltrs.grc.nasa.gov/reports/2006/TM-2006-214122.pdf, accessed 7-6, JG)

Mining of the outer planets may take many directions, the two most important of which are mining the moons and the atmospheres of those planets. Using specialized factories, the energy of hydrogen, helium, and helium 3 gases can allow us to power nuclear fusion propulsion systems. Chemical rockets for landing and ascending from the moons can also derive their propellants from the moons’ ices and/or the planetary atmospheres. Many issues may make the implementation of these ideas more complex than was originally thought. The dynamics of the atmosphere, radiation, and the energy for orbital transfer all call for very energetic and reliable propulsion systems to allow for rapid, reliable, and repetitive visits to the planets and their moons. For example, due to the more predictable atmospheric conditions and wind speeds at Uranus and Neptune, mining with aerostat borne stations seems more applicable for use there, while with more dynamic winds at Jupiter and Saturn, more aggressive aerodynamic options (high speed cruiser aircraft) may be needed.

Radiation & gravity destroys solvency – studies prove

Zimbio 11 (Tech. Support, 7-3, http://www.zimbio.com/Laptop+Reviews/articles/ijH3NltSs33/Jupiter+fifth+planet+Sun, accessed 7-7, JG)

NASA has speculated on the feasibility of mining the atmospheres of the outer planets, particularly for helium-3, an isotope of helium rare on Earth, but highly desired in nuclear fusion research. Factories stationed in orbit could mine the gas and deliver it to visiting craft.HP Compaq 2510p Adapter However, the Jovian system in general poses particular disadvantages for colonizing because of its severe radiation environment and its particularly deep gravity well. Its radiation would deliver about 36 Sv (3600 rem) per day to unshielded colonists at Io and about 5.4 Sv (540 rems) per day to unshielded colonists atEuropa.Dell Studio PP39L Battery Exposure of approximately .75 Sv over a period of a few days is enough to cause radiation poisoning, and about 5 Sv over a few days is fatal.

Aff – Gas Planets CP – Jovian = Only Jupiter

The Jovian System is only Jupiter and its main moons

Reference.com No Date (http://ask.reference.com/web?q=Jovian%20system&l=dir&qsrc=2891&o=10616, accessed 7-8, JG)

Jupiter and the Jovian System - The Solar System on Sea and Sky The Jovian System consists of Jupiter, fifth planet from the Sun, and its system of moons, including ganymede, europa, io, and callisto.

\*\*\*Links to Generics\*\*\*

He-3 Mining – Spending Links

Transportation would cost hundreds of millions

Packard 11 (Steve, Scientist, 5-10, http://depletedcranium.com/once-again-helium-3-from-the-moon-is-not-going-to-solve-our-energy-problems/, accessed 7-8, JG)

Getting to the moon is difficult. To do so you need a big rocket and generally, you can only use that rocket once. Because of this, any craft that goes to the moon will necessarily cost hundreds of millions of dollars to send there. Getting something back from the moon is even harder, because it requires that a spacecraft be sent to the moon with the capability of launching itself back into space and returning to earth.

Mining the moon would be monumentally expensive

Popular Mechanics 4(P.M. Online, 12-7, http://www.popularmechanics.com/science/space/moon-mars/1283056?page=4, accessed 7-6, JG)

Moon The discovery of a helium isotope, helium-3, on the moon has given scientists ideas on how to produce electricity far more efficiently than with hydrocarbons or current nuclear plants. The large amounts of energy would come without danger of releasing radioactive substances into the atmosphere. Mining the lunar surface would not be cheap; the investment would be comparable to building a major transcontinental pipeline.

The vehicle to transport the H-3 would itself costs 5 billion

Schmitt 4(Harrison, Geologist @NASA, http://www.scribd.com/doc/11622789/Mining-the-Moon, accessed 7-6, JG)

Perhaps the most daunting challenge to mining the moon is designing the spacecraft to carry the hardware and crew to the lunar surface. The Apollo Saturn V spacecraft remains the benchmark for a reliable, heavy-lift moon rocket. Capable of lifting 50 tons to the moon, Saturn V's remain the largest spacecraft ever used. In the 40 years since the spacecraft's development, vast improvements in spacecraft technology have occurred. For an investment of about $5 billion it should be possible to develop a modernized Saturn capable of delivering 100-ton payloads to the lunar surface for less than $1500 per pound.

The plan is prohibitively costly for government action

Stewart 9 (Nick, 5-22, <http://www.northernontariobusiness.com/Industry-News/mining/Mining-the-moon-a-real-possibility--former-astronaut.aspx>, 7-6-11, SRF)

Other costs, however, are much more daunting. Schmitt estimates thatmerely demonstrating the commercial viability of helium-3 fusion would require $5 billion, with another $5 billion required to recreate the proper class of heavy-lift boosters. Another $2.5 billion would be needed to develop habitats and processing facilities for lunar settlements capable of annually producing 100 kilograms of helium-3. Semi-automated mining robots will likely need to be part of the solution, Schmitt adds, as they will be "critical" to keeping down operational costs. Humans will still be needed to oversee operations and maintenance, however, meaning that a small operation could use a moon-mining crew of four, with two groups alternating on two shifts per day. With these kinds of costs, global governments willlikelybe left outof the equation. Indeed, few governments have expressed an interest in the potential of lunar helium-3 fusion, with the exception of China. As such, the only way such a project could become a reality is through support from the private sector, he says.

He-3 Mining – Politics Link

Mining has technical and political obstacles

Cunningham 10(Walter, Former Apollo Astronaut, , 2-6, http://www.chron.com/disp/story.mpl/editorial/outlook/6854790.html, accessed 7-6, JG)

Helium 3 fueled hydrogen provides a potential of providing clean, virtually limitless energy for the foreseeable future. Of course, there are obstacles in the path of a helium 3 fusion future, both technical and political. Developing a reactor that will create more energy than it consumes to create a helium 3 fusion reaction will be daunting. Then there are the problems of developing of lunar mining techniques and a cost effective transportation infrastructure between Earth and the moon. The political problem is almost as acute. The Fusion Technology Institute is funded with private money, as the Energy Department thinks that space based helium 3 is a NASA problem and NASA thinks fusion energy is an Energy Department problem. It will take a leader of vision to sort out the turf battles and get Schmitt's plan rolling.

He-3 Mining – Private CP Solvency

Private sector lunar H-3 mining has better solvency – it avoids politics & isn’t subject to financial constraints

Kazantis et. al. 6(Nikolaos, John Wilkes, Bachelor Sciences @ Worcester Polytechnic Institute, 2-17, http://www.wpi.edu/Pubs/E-project/Available/E-project-031306-122626/unrestricted/IQP.pdf, accessed 7-6, JG)

The weighs and the criteria for evaluation used in Table 7 depict Dr. Schmitt’s principles and values and hence represent only one point of view. Though it is possible that Dr. Schmitt has in fact gathered data from the corresponding sectors, this is not 71 evident from his text. Regardless of the weighing distribution and the total that Dr. Schmitt arrives to, the issues he presents are relevant and should be evaluated in depth for any commercial enterprise of the size of lunar He-3 mining. For example, the ability of private sectors to successfully introduce new technology into an existing market place gives the private sector a competitive advantage in development. However, the private sector has a very significant obstacle to overcome, capital investment. Unlike the government sector that has the power and resources to engage in monumental enterprises through specialized agencies, the private sector is subject to larger financial liability and is more reluctant to invest in risky ventures. Nonetheless, the potential for a technology spinoff, given a weighting of 1 under Schmitt’s scheme, is a valuable asset for risk taking entrepreneurs. Because the strengths of the private sector do not overlap with the strengths of the government sector, and in fact these two sectors complement each other in terms of capital and efficiency, a joined private-government initiative would be very likely. Such an initiative is not without precedents; technology spinoffs of the Apollo missions led to a huge boom in the aeronautics industry to the point that NASA now flies aircraft manufactured by components made in commercial industries. One of the large hindrances that the government and even international initiatives face is that they must respond to the public about their decisions and are thus subject to monumental political pressure. Financing would be compromised for a long term venture, since it would be subject to the approval ratings of the current governments, the political choices of leaders and the whole weight of bureaucracy. These indirect links would endanger the long term sustainability of the project if financed uniquely by the government. 72 The efficacy of the private sector to turn projects into revenues is a big asset that seems to favor the private approach over the others. Schmitt (pg. 165) argues that the likelihood of success is, without competition, higher if the all private approach is adopted.

Private enterprise solves-empirics

Jain 11 (Naveen, Founder of Moon Express, *Huffington Post,* 4-20, <http://www.huffingtonpost.com/naveen-jain/our-sputnik-moment-us-ent_b_851312.html>, 7-6-11, SRF)

However, if we allow private enterprise to explore and take advantage of the Moon's resources, we may set ourselves on the road to energy independence. To re-launch our space program, we need private enterprise to step into the void. Government funding only needs to take us to the point where the technology has been developed to get us to the Moon -- and we already have that. It's a model that's been used successfully in the past: the military first developed the Internet, and private enterprise then seized on its commercial potential; the same thing occurred with GPS technology.

He-3 Mining – Privates avoids spending

CP spends less money

Jain 11 (Naveen, Founder of Moon Express, *Huffington Post,* 4-20, <http://www.huffingtonpost.com/naveen-jain/our-sputnik-moment-us-ent_b_851312.html>, 7-6-11, SRF)

There's also the question of whether we can transport resources from the Moon in a cost-effective manner. Perhaps the cost of rocket launches-- by far the greatest expense for a Moon mission --will come down as more entrepreneurs move into this market, or new technology will make them cheaper. It's even possible to create rocket fuel from resources on the Moon, which would slash return costs and even lower launch costs from Earth. On the other hand, mining and transporting these resources back to the Earth could depress prices as supplies grow, making such ventures less appealing to entrepreneurs. As with all private market endeavors, many will want to take a wait-and-see approach to the Moon's market potential. But therein lies the opportunity for early movers who apply entrepreneurship to the opening of whole new markets, and in the case of the Moon, a whole new world.

Asteroid Mining – Spending Link

Plan is super expensive

Brak 6(Ronald, Research Scientist, 2-6,

http://ronaldbrak.blogspot.com/2006/02/great-asteroid-mining-con.html, accessed 7-6, JG)

Just for the sake of the argument, I would call this imaginary substance a liquid. If only we could convert say platinum ore into some sort of magical liquid solution when we refine it. Wait a minute! That’s what they actually do in platinum refineries! Several times in fact! Freaky, hey? But even so, extracting platinum from ore is a very expensive and difficult business, despite the weightlessness offered by this incredible stuff called liquid. Then there’s the argument that we have to go into space and mine asteroids now because the earth is running out of metals. Well this just isn’t true. A couple of hours drive from my house there is enough copper in the ground to supply the earth for maybe a couple of hundred years. But nobody is extracting it because the ore is so low grade it would take a hellacious amount of energy and effort to refine it. The more energy it costs to extract, the more the copper is going to cost. The earth might be running out of cheap and convenient high quality deposits of some metals, but it’s certainly not running out of metal. In the future we may have to pay extra for the energy to extract metals from low grade deposits, but it’s still going to be easier to extract copper from ore that only has a few kilos of copper per ton than it’s going to be to extract copper from asteroids that have only grams of copper per ton.

Asteroid Mining – Spending Link

Asteroid mining costs billions of dollars

Bonsor 4 (Kevin, Space Propulsion Inc., 2-29, http://www.sps.aero/Key\_ComSpace\_Articles/LibTech/LIB-029\_How\_Asteroid\_Mining\_Will\_Work.pdf, accessed 7-9, JG)

The drive to set up a mining operation on an asteroid is a matter of simple economics. While building an asteroid mine will cost billions of dollars, it will be far cheaper than carrying supplies from Earth to the moon or Mars. Spacecraft would have to carry food and supplies for the mining crew and the equipment for the mine. Newly developed spacecraft should make landing on an asteroid possible. After all, we have already landed on the moon, and some asteroids pass by closer than the moon. A spacecraft going to an asteroid would need less rocket power and fuel than one going to the moon.

Mining would cost tens of billions because of cargo

NASAWatch.com 9 (Archives, 2-24, http://www.wordnik.com/words/asteroid%20mining, accessed 7-9, JG)

An asteroid mining operation, from here, would require many tens of billions of dollars worth of application specific hardware from interplanetary electric cargo cruisers to a new fleet of STS style ships for bulk cargo return.

**Asteroid Mining – Private Solve CP Solvency**

Private mining solves better

Prado 2 (Mark, Permanent.com, http://www.permanent.com/m-1stmis.htm, accessed 7-6, JG)

While I would happily be of assistance to either in the absence of much serious work, at this point in time I'd rather not lobby arrogant career government bureaucrats any longer and instead promote a private sector venture, and indeed also invite government employees who've had enough of their governmental limitations. Understand, most of the government work on using lunar materials is for a lunar scientific base and a steppingstone to a manned Mars mission, which is an old, traditional NASA goal, and not for making products and services to benefit Earth economies and people as is the purpose of PERMANENT and certain others. This article focuses on a private sector mission, which appears more able to act quickly in the near term to develop the market due to less bureaucracy and delays in decision making, inclusions of freelance talent, and leaner & meaner organizational options. A free enterprise space economy would be naturally more sustainable, more accountable to practical needs and wants, and would be able to offer many more products and services. While governments have more money and can absorb risk and long payback times, what is needed is well within reach by the private sector -- less money than the Alaska oil pipeline and many offshore oil platforms, and a shorter payback time than those megaprojects. Unlike offshore oil platforms, we're guaranteed to not come up with a dry hole. It's lower risk, higher payback, and greater potential. The risk is debatable in the details but is fairly clear in the general decision points. For example, traditional government-contracting researchers (who tend to be low risk types) state over and over in their research bids that we still don't know precisely what is the best design of equipment to use to mine the moon (and how much different is the story than it was 20 years ago... before the last 20 years of R&D in this field…), and we need to pay them to perform more research (can we expect endless technical papers regarding better equipment?) ... but for the first major step out an optimal equipment design is not necessary. Indeed, we may be wasting our time with paper studies until we retrieve some real asteroidal material and start working with it in orbit. So, what we really need to do is simply go stake a real estate claim on an asteroid, characterize it, get some asteroid resources, bring them back to Earth orbit, start experimenting with and developing some space-based industrial techniques on this retrieved material, and stake and develop patented systems. We should use relatively unspecialized but flexible equipment that will do a satisfactory enough job to turn a profit, even though it might turn out to be far from what would have been proper or optimal. We should follow the successful Apollo adage: "Better is the enemy of good enough." Time counts, too. Below, I lay out a general scenario whereby we retrieve some bulk asteroidal material into low Earth orbit, start developing space based industrial equipment using this bulk material, make some useful and valuable products as a result of this R&D, and make large amounts of money in indirect ways. A first mission, with the proper public relations effort, would surely mobilize public attention, including capital from the world's biggest movers and shapers. The current barriers are publicity of the concepts (which this book deals with) and the psychological barrier ("Is this for real?" -- but forget the die-hard skeptics -- cynics never have found a way to make a difference in making history). A first mission, however modest, would open the floodgates to investment and competition - a "space race" between private companies, and the owner of the first mission would have a huge lead on the competition as well as be in a strong position to sell to the competition. What better game plan is there? A first mission to retrieve asteroidal resources into Earth orbit needs only to go collect a huge mass of materials and return this bulk to Earth orbit. Nothing fancy or advanced. The same could be said for lunar materials. However, I think asteroidarial materials are cheaper because less fuel is needed (i.e., smaller, cheaper spacecraft), it doesn't need to perform a risky landing and launch from a big gravitational body like the Moon (especially with a sizeable collection of material!), and the quality of material from asteroids is much better. (In the moon vs. asteroids debate, few people question that asteroids offer much better materials in the long run.)

\*\*\*Helium-3 Good\*\*\*

He-3 Good – Prolif Shell (1/3)

Helium-3 shortage will endanger US anti-proliferation security measures

Dixon 10 (Darius, Danger Room: What’s Next In National Security, “Helium-3 Shortage Could Mean Nuke Detection ‘Disaster’” 4/29 JF)

Stopping nuclear smuggling is already tough. But it’s about to get a lot harder. Helium-3, a crucial ingredient in neutron-particle-detection technology, is in extremely short supply. The helium-3 isotope represents less than 0.0002 percent of all helium. Of that, about 80 percent of helium-3 usage is devoted to security purposes, because the gas is extremely sensitive to neutrons, like those emitted spontaneously by plutonium. Projected demand for the nonradioactive gas in 2010 is said to be more than 76,000 liters per year, while U.S. production is a mere 8,000 liters annually, and U.S. total supply rests at less than 48,000 liters. This shortage wasn’t identified until a workshop put on by the Department of Energy’s Office of Nuclear Physics in August 2008. The shortage is so severe, explained Dr. William K. Hagan, acting director of the Domestic Nuclear Detection Office at DHS, that even handheld and backpack detectors used by the U.S. Coast Guard, Customs and Border Protection, and Transportation Security Administration would be affected. According to the hearing’s charter, U.S. exports of the precious gas have ceased, and the International Atomic Energy Agency has been informed that it must diversify its helium-3 sources used for their nuclear-nonproliferation work. A lack of helium-3 will also adversely affect the oil and gas industry. These detectors are used to locate hydrocarbon reservoirs, and several measurement tools are designed around the use of helium-3, said GE Energy rep Anderson. Other affected industries include cryogenic research and magnetic resonance imaging.

Helium-3 supply is down because of decreased production of nukes—limits radiation detection for national security

**Washington University Newsroom 10**(Washington University in St. Louis, “WUSTL Professor testifies on helium shortage” http://news.wustl.edu/news/Pages/20644.aspx 4/22 JF)

The sudden shortage of a nuclear weapons production byproduct that is critical to industries such as nuclear detection, oil and gas, and medical diagnostics was the focus as a House Science and Technology panel heard testimony today from a professor at Washington University in St. Louis. Helium-3is a nontoxic byproduct of producing nuclear weapons. It is a stable isotope with two protons and one neutron in its nucleus, one fewer neutron than the more common form of helium. And that missing neutron gives it special physical properties that have made it essential in cryogenics, medical diagnostics, oil and gas operations and nuclear radiation detection. The helium 3 isotope is relatively rare on Earth, so it is manufactured instead of recovered from natural deposits. It is formed when tritium, a radioactive form of hydrogen, decays. Only the United States and Russia produce significant amounts of tritium gas. Current supplies of helium-3 are sourced from the refurbishment and dismantlement of the nuclear stockpile. Supplies have dwindled because U.S. nuclear weapons production has come to a virtual halt with the end of the Cold War. But since the Sept. 11, 2001, attacks, demand has increased for helium-3 because of its use as a neutron detector in radiation monitors for national security, nonproliferation and homeland security applications.

Radiation detection is key to proliferation prevention

Richardson, Yuldashev, and Knapp 6 (Jeffrey, Lawrence Livermore National Laboratory, Bekazhed, Institute of Nuclear Physics, and Richard, Institute of Nuclear Physics, “Improved Technology To Prevent Proliferation and Nuclear Terrorism” Pg. 1 6/15 JF)

As the world moves into the 21st century, the possibility of greater reliance on nuclear energy will impose additional technical requirements to prevent proliferation. In addition to proliferation resistant reactors, a careful examination of the various possible fuel cycles from cradle to grave will provide additional technical and nonproliferation challenges in the areas of conversion, enrichment, transportation, recycling and waste disposal. Radiation detection technology and information management have a prominent role in any future global regime for nonproliferation. As nuclear energy and hence nuclear materials become an increasingly global phenomenon, using local technologies and capabilities facilitate incorporation of enhanced monitoring and detection on the regional level. Radiation detection technologies are an important tool in the prevention of proliferation and countering radiological / nuclear terrorism. A variety of new developments have enabled enhanced performance in terms of energy resolution, spatial resolution, passive detection, predictive modeling and simulation, active interrogation, and ease of operation and deployment in the field.

He-3 Good – Prolif Shell (2/3)

Detection technology is key to controlling cross-border transportation of nuclear material

NNSA 11 (National Nuclear Security Administration, http://nnsa.energy.gov/aboutus/ourprograms/nonproliferation accessed 7/8 JF)

NNSA is working to deter and detect illicit transfers of weapons-usable nuclear and radiological materials and equipment, prevent the spread of sensitive nuclear weapons technology and develop cutting-edge nuclear detection technologies. NNSA’s work enhances the capabilities of our foreign partners to interdict illicit trafficking of nuclear and radiological materials by deploying radiation detection systems at high-risk border crossings, airports and seaports. NNSA is particularly concerned that terrorists could use the global maritime shipping network to smuggle nuclear and radiological materials or warheads. By installing radiation detection systems at major seaports throughout the world, NNSA strengthens the detection and interdiction capabilities of our partner countries. Preventing terrorist access to weapons of mass destruction remains one of NNSA’s highest priorities. NNSA helps to keep the world’s most dangerous materials out of the hands of the world’s most dangerous people by securing nuclear weapons and nuclear and radiological materials at their source, and improving security practices around the world. Additional nuclear security challenges concern the effectiveness and credibility of international nuclear safeguards and export controls. Growing nuclear energy demand and concerns over the spread of sensitive nuclear technologies place increasing strain on international safeguards. NNSA is working to update international nuclear safety standards to reflect present day challenges and to ensure sustained U.S. leadership and investment in nuclear nonproliferation technologies and expertise.

Insufficient detection means terrorists can get nuclear weapons—opportunities, capability, and risk of mass destruction

Gard 11 (Robert, Chairman of the Center for Arms Control and Non-Proliferation, “A Joint Study On Nuclear Terrorism” http://armscontrolcenter.org/policy/nuclearterrorism/articles/a\_joint\_study\_on\_nuclear\_terrorism/ JF)

The joint study warns of a persistent danger that terrorists could obtain or produce nuclear explosive devices and employ them with catastrophic consequences, and that the threat is increasing due to globalization and the proliferation of technical knowledge.“If current approaches toward eliminating the threat are not replaced with a sense of urgency and resolve,” the study report warns, “the question will become not if but when, and on what scale, the first act of nuclear terrorism occurs.” The study states that making a nuclear bomb is potentially within the capabilities of a “technically sophisticated terrorist group.” But the UN Terrorism Prevention Office warned as early as 2001thatthere were some 130 terrorist groups capable of developing a home-made nuclear bomb if they could obtain highly enriched uranium or plutonium. The “catastrophic” result of a nuclear attack would not be limited to the resultant loss of life and massive destruction, the study notes, but it also would produce international psychological trauma and widespread political and economic chaos. Both presidents George W. Bush and Barack Obama have recognized that the greatest threat to U.S. and international security is a terrorist attack with a nuclear weapon. This prompts the question as to why, especially after 9/11 and the explicit threats posed by terrorist organizations, “current approaches” are inadequate, as the report concludes. The study identifies two principal reasons: secrecy on the part of nation states that want to protect their sovereignty and, the most significant barrier, a widespread attitude of complacency. There are dozens of research reactors around the world using highly enriched uranium, the easiest materials for terrorists to use to make explosive nuclear devices, and there are additional reactors using highly enriched uranium to produce medical isotopes. Supplying fuel to these reactors requires transporting to the reactor sites hundreds of kilograms of highly enriched uranium, when these materials are highly vulnerable to attack or diversion. In addition, many of these reactors have minimum security measures; they must be shut down and the highly enriched uranium removed, or converted to low enriched uranium fuel, to be made safe from terrorists.

He-3 Good – Prolif Shell (3/3)

Terrorist nuclear use triggers global nuclear war ending in extinction

Morgan 9 (Dennis, Hankuk University of Foreign Studies, Yongin Campus - South Korea Futures, Volume 41, Issue 10, December 2009, Pages 683-693, World on Fire JF)

Moore points out what most terrorists obviously already know about the nuclear tensions between powerful countries. No doubt, they’ve figured out that the best way to escalate these tensions into nuclear war is to set off a nuclear exchange. As Moore points out, all that militant terrorists would have to do is get their hands on one small nuclear bomb and explode it on either Moscow or Israel. Because of the Russian “dead hand” system, “where regional nuclear commanders would be given full powers should Moscow be destroyed,” it is likely that any attack would be blamed on the United States” Israeli leaders and Zionist supporters have, likewise, stated for years that if Israel were to suffer a nuclear attack, whether from terrorists or a nation state, it would retaliate with the suicidal “Samson option” against all major Muslim cities in the Middle East. Furthermore, the Israeli Samson option would also include attacks on Russia and even “anti-Semitic” European cities In that case, of course, Russia would retaliate, and the U.S. would then retaliate against Russia. China would probably be involved as well, as thousands, if not tens of thousands, of nuclear warheads, many of them much more powerful than those used at Hiroshima and Nagasaki, would rain upon most of the major cities in the Northern Hemisphere. Afterwards, for years to come, massive radioactive clouds would drift throughout the Earth in the nuclear fallout, bringing death or else radiation disease that would be genetically transmitted to future generations in a nuclear winter that could last as long as a 100 years, taking a savage toll upon the environment and fragile ecosphere as well. And what many people fail to realize is what a precarious, hair-trigger basis the nuclear web rests on. Any accident, mistaken communication, false signal or “lone wolf’ act of sabotage or treason could, in a matter of a few minutes, unleash the use of nuclear weapons, and once a weapon is used, then the likelihood of a rapid escalation of nuclear attacks is quite high while the likelihood of a limited nuclear war is actually less probable since each country would act under the “use them or lose them” strategy and psychology; restraint by one power would be interpreted as a weakness by the other, which could be exploited as a window of opportunity to “win” the war. In other words, once Pandora's Box is opened, it will spread quickly, as it will be the signal for permission for anyone to use them. Moore compares swift nuclear escalation to a room full of people embarrassed to cough. Once one does, however, “everyone else feels free to do so. The bottom line is that as long as large nation states use internal and external war to keep their disparate factions glued together and to satisfy elites’ needs for power and plunder, these nations will attempt to obtain, keep, and inevitably use nuclear weapons. And as long as large nations oppress groups who seek self-determination, some of those groups will look for any means to fight their oppressors” In other words, as long as war and aggression are backed up by the implicit threat of nuclear arms, it is only a matter of time before the escalation of violent conflict leads to the actual use of nuclear weapons, and once even just one is used, it is very likely that many, if not all, will be used, leading to horrific scenarios of global death and the destruction of much of human civilization while condemning a mutant human remnant, if there is such a remnant, to a life of unimaginable misery and suffering in a nuclear winter.

He-3 Good – Prolif – Timeframe

Timeline for shortage affecting security efforts is late 2011

Aloise 10(Gene, Director of Resources and Environment @ US Government Accountability Office, “Combating Nuclear Smuggling” Testimony to the Senate, 6/30 JF)

Similarly, in our view, had a strategic plan to complete the global nuclear detection architecture been in place, DHS may have been less likely to expend time and resources on ASPs when a radiation detection system was already in place at ports of entry but not at other potential pathways into the United States. A recent development that complicates the future deployments of radiation detection equipment is that both PVTs and ASPs require helium-3, which was recently found to be in short supply.14 According to DHS officials, if an alternative to helium-3 is not found by late 2011, further deployments of PVTs planned for the southern land border and at seaports may be delayed. We are currently conducting work on the helium-3 shortage—describing the federal government’s current priority for how the limited supply of helium-3 will be allocated and assessing, among other things, what alternative technologies are currently available or in development that could replace helium-3. We plan to issue a report later this year.

He-3 Good – General Shortage

Helium-3 shortage hurts national security, medical research, and prevents research into helium-3 fusion energy

Marder 11 (Jenny, PBS Newshour, “Helium 3 Shortage Affects National Security, Medicine” http://www.pbs.org/newshour/rundown/2011/02/helium-3-shortage-reaches-across-sectors.html 2/16 JF)

And it's not just national security that's affected, but also the research and medical communities. The rare isotope is used in cryogenics- it can reduce temperatures to near absolute zero - and medical imaging technology, providing a non-radioactive source of lung imaging. The U.S. stopped making helium 3 in 1988, but with ramped up security systems after the 9/11attacks, the need for it has far outstripped demand."It's a huge national security problem now," said Charles Ferguson, president of the Federation of American Scientists and an expert on special nuclear materials. Kulcinski and his research team have focused on helium 3 fusion reactions as a possible radioactive-free energy source. They've been using their supply of the gas to suss out reactions and understand its physics, but the price recently skyrocketed from $1,000 per gram to about ten times that amount, essentially grinding the research to a halt."It does not occur in nature," Kulcinski said. "If that source goes away, there is no other place on earth to get helium 3...If we can't get helium 3, then our research will be

finished."

**Helium-3 is key to international nuclear security and US missile defense**

Shea and Morgan 10 (Dana and Daniel, specialists in science and technology policy, “The Helium-3 Shortage: Supply, Demand, and Options For Congress” 12/22 Pg. 5, 16-17 JF)

The demand for helium-3 for national and homeland security purposes falls into two main categories: the detection of smuggled radiological and special nuclear material and the monitoring of known special nuclear material to ensure its security.53The Department of Defense, Department of State, NNSA, and DHS all have deployed radiation detection equipment to detect smuggled radiological and nuclear material.54 Through programs such as Cooperative Threat Reduction, the Second Line of Defense, and the Radiation Portal Monitor program, these agencies have deployed thousands of radiation portal monitors both domestically and overseas. Each portal uses approximately 50 liters of helium-3 as the basis for its neutron detection capability. Some of the programs have been in place since before 2001. Others, such as those operated through DHS, were established later. The broad expansion of these deployments has provided the greatest demand for helium-3and been the largest drain on the helium-3 stockpile. The Department of Defense and NNSA also use helium-3 in neutron detectors to ensure that stores of special nuclear material are fully accounted for. Accurate neutron counting over long time periods is one way to monitor the continued presence of materials such as plutonium. In addition, the United States contributes helium-3 to meet the nuclear security and monitoring needs of the International Atomic Energy Agency(IAEA).Department of Defense guidance and navigation systems for munitions, missiles, aircraft, and surface vehicles include ring laser gyroscopes that use helium-3. Testing and qualification are under way on an alternative gas for this purpose.5

**Helium-3 serves numerous purposes in scientific research**

Shea and Morgan 10 (Dana and Daniel, specialists in science and technology policy, “The Helium-3 Shortage: Supply, Demand, and Options For Congress” 12/22 Pg. 5, 18 JF)

Scientific uses of helium-3 are diverse, ranging from neutron detection to cryogenics, laser physics, and research on the properties of helium-3 itself. Large-scale government research facilities, such as the DOE Spallation Neutron Source at Oak Ridge National Laboratory in Tennessee, may use tens of thousands of liters. Numerous smaller, laboratory-scale users are in academia and elsewhere. Although individual university researchers use smaller quantities, their ability to pay the currently high price for market-rate helium-3 may be limited. Although they are part of the private sector, their research is often funded by federal agencies. The United States also participates in international science projects that require helium-3, such as ITER (originally called the International Thermonuclear Experimental Reactor), currently under construction in France. The United States, as well as engaging directly in scientific activities that require helium-3, has historically been a major source of helium-3 for the international scientific community. Some foreign scientists may depend on U.S.-supplied helium-3 for their research. Although some of these foreign scientists may work independently, many of them are likely colleagues and collaborators of U.S. scientists.

He-3 Good – Fusion Safe

Helium-3 fusion is 100% safe—it goes straight to electricity, produces no radiation, and accidents pose no risk

Kulcinski 93 (Gerald, Center for Space Automation and Robotics @ U of Wisconsin, “Helium-3 Fusion Reactors – A Clean and Safe Source of Energy in the 21st Century” April P. 3-4 JF)

The fourth reaction is that between two 3He nuclei to produce 2 protons and a normal 4He nucleus. This reaction is a perfect nuclear reaction in that it starts with no radioactivity, produces no radioactivity, and there are no side reactions that can produce radioactive isotopes. Obviously, if this was all there was to it, we would opt for the 3He-3He reaction. Even though all of the above reactions have a positive Q value (that is, they release more energy than required to cause them to fuse), the rate at which they react is also an important consideration. Finally, the 3He-3He reaction in an electrostatic device, produces energy almost entirely in charged particles that can be converted directly to electricity at efficiencies of 70-80%.Even more importantly, notice the lack of neutron production. This means that there will be no radioactive material to deal with in the event of an accident or even in a maintenance situation. What would we expect of fusion reactors utilizing these fuels? Any fusion reactor, regardless of the fuel cycle, would not emit any greenhouse gases. In addition, compared to fission reactors, the amount of long-lived radioactivity generated would be less and there is no possibility of any runaway nuclear reactions. The worst case scenario for an accident in fusion devices varies from no off-site fatalities (DT), to no evacuation required (D-3He) to no external effects at all with 3He-3He.

He-3 Good – Cost

Helium-3 mining would be easy and inexpensive

Popular Mechanics 4 (“Mining The Moon” 12/7 http://www.popularmechanics.com/science/space/moon-mars/1283056 JF)

Because the concentration of helium-3 is extremely low, it would be necessary to process large amounts of rock and soil to isolate the material. Digging a patch of lunar surface roughly three-quarters of a square mile to a depth of about 9 ft. should yield about 220 pounds of helium-3--enough to power a city the size of Dallas or Detroit for a year. Although considerable lunar soil would have to be processed, the mining costs would not be high by terrestrial standards. Automated machines might perform the work. Extracting the isotope would not be particularly difficult. Heating and agitation release gases trapped in the soil. As the vapors are cooled to absolute zero, the various gases present sequentially separate out of the mix. In the final step, special membranes would separate helium-3 from ordinary helium. The total estimated cost for fusion development, rocket development and starting lunar operations would be about $15 billion. The International Thermonuclear Reactor Project, with a current estimated cost of $10 billion for a proof-of-concept reactor, is just a small part of the necessary development of tritium-based fusion and does not include the problems of commercialization and waste disposal. The second-generation approach to controlled fusion power involves combining deuterium and helium-3. This reaction produces a high-energy proton (positively charged hydrogen ion) and a helium-4 ion (alpha particle). The most important potential advantage of this fusion reaction for power production as well as other applications lies in its compatibility with the use of electrostatic fields to control fuel ions and the fusion protons. Protons, as positively charged particles, can be converted directly into electricity, through use of solid-state conversion materials as well as other techniques. Potential conversion efficiencies of 70 percent may be possible, as there is no need to convert proton energy to heat in order to drive turbine-powered generators. Fusion power plants operating on deuterium and helium-3 would offer lower capital and operating costs than their competitors due to less technical complexity, higher conversion efficiency, smaller size, the absence of radioactive fuel, no air or water pollution, and only low-level radioactive waste disposal requirements. Recent estimates suggest that about $6 billion in investment capital will be required to develop and construct the first helium-3 fusion power plant. Financial breakeven at today's wholesale electricity prices (5 cents per kilowatt-hour) would occur after five 1000-megawatt plants were on line, replacing old conventional plants or meeting new demand.

He-3 Good – Space Exploration

A helium-3 venture opens the door to other space exploration

**Popular Mechanics 4**(“Mining The Moon” 12/7 http://www.popularmechanics.com/science/space/moon-mars/1283056 JF)

Returning to the moon would be a worthwhile pursuit even if obtaining helium-3 were the only goal. But over time the pioneering venture would pay more valuable dividends. Settlements established for helium-3 mining would branch out into other activities that support space exploration. Even with the next generation of Saturns, it will not be economical to lift the massive quantities of oxygen, water and structural materials needed to create permanent human settlements in space. We must acquire the technical skills to extract these vital materials from locally available resources. Mining the moon for helium-3 would offer a unique opportunity to acquire those resources as byproducts. Other opportunities might be possible through the sale of low-cost access to space. These additional, launch-related businesses will include providing services for government-funded lunar and planetary exploration, astronomical observatories, national defense, and long-term, on-call protection from the impacts of asteroids and comets. Space and lunar tourism also will be enabled by the existence of low-cost, highly reliable rockets. With such tremendous business potential, the entrepreneurial private sector should support a return to the moon, this time to stay. For an investment of less than $15 billion--about the same as was required for the 1970s Trans Alaska Pipeline--private enterprise could make permanent habitation on the moon the next chapter in human history.

A helium-3 project on the moon yields water, rocket fuel, and metals for long-term space ventures

The Engineer 9 (technology and innovation magazine, “Mining The Moon”http://innovation-nation.ca/pdf/Mining-the-moon\_In-depth\_The-Engineer.pdf 4/24 JF)

One of the most useful resources that is thought to be present on the Moon is the water ice that scientists believe may exist in the shadowed craters at the lunar poles. Deposited by comets, water ice, if present in large enough quantities, could provide many of the materials essential for a long stay in space, explained Crawford. ’If you’ve got ice, you’ve got a supply of water that is useful in itself and it is electrolysable into hydrogen and oxygen — your two main rocket propellants of choice.’ So far, evidence of ice deposits is based on the rather sketchy data acquired from an instrument flown around the Moon on the lunar prospector spacecraft in the late1990s. But Crawford is hopeful that NASA’s Lunar Reconnaissance Orbiter (LRO), which is scheduled for launch this June and able to detect smaller quantities of ice, will provide a clearer picture. But even if there is no ice and He-3 turns out to be a dead end, the moon still has plenty to offer, and numerous scientists have devised methods for extracting both hydrogen and oxygen from the lunar regolith itself. Of particular promise is a technique that was originally developed by UK firm British Titanium for extracting titanium from ilmenite, a titanium iron-oxide mineral that occurs in some lunar lavas. In the process of extracting titanium, oxygen is also produced and, according to Crawford, the company is now investigating the potential of the technique for producing oxygen on the moon. Metals such as titanium and aluminium could also be a useful lunar resource for future astronauts. Carole McLemore, project lead for NASA’s ISRU programme, is currently looking at different methods of extracting aluminium and titanium from lunar rock for use in fabrication processes on the Moon. According to McLemore, NASA’s vision is that astronauts will be able to use rapid-manufacturing techniques in order to produce components and tools from lunar metals.

Using resources on the moon cuts launch costs and enables future missions

Howell 10 (Elizabeth, Spaceref Canada, “Lunar In-Situ Resource Utilization (ISRU) to Lower Exploration Costs” 9/17 http://spaceref.ca/event/leag2010/lunar-in-situ-resource-utilization-isru-to-lower-exploration-costs.html JF)

"With limited government funding and private investments, ISRU is an essential part of fulfilling future lunar and space exploration visions by ultimately enabling lower mission mass and cost," Mr. Zhou wrote in an e-mail interview with SpaceRef. "With the current economical situation, ISRU takes advantage of commonality in resources and processes already available on the lunar surface. From lunar lava tubes to sulphur-based concrete, ISRU is the umbrella that comprise of refining construction material and developing consumables and manufacturable components for infrastructures to support future lunar missions."Zhou's and Mardon's poster on ISRU pointed out that reducing the amount of material space missions bring from earth is a "difficult obstacle". The researchers stated areas of focus need to be items such as consumables, repair, manufacturing and surface construction.

He-3 Good – AT: Fusion Problems

All their fusion evidence assumes current nuclear processes – the aff uses a new fusion reactor recently invented

Hedman 6 (Eric, Chief Tech. Officer @ Logic Design, 1-16, http://www.thespacereview.com/article/536/1, accessed 7-7, JG)

Professor Kulcinski’s lab is running the only helium-3 fusion reactor in the world. He has an annual research budget that is barely into six figures and allows him to have five graduate research assistants working on the project. Compared to what has been spent on other fusion projects around the world, the team’s accomplishments are impressive. Helium-3 would not require a tokomak reactor like the multibillion-dollar one being developed for the international ITER project. Instead, his design uses an electrostatic field to contain the plasma instead of an electromagnetic field. His current reactor contains spherical plasma roughly ten centimeters in diameter. It can produce a sustained fusion with 200 million reactions per second producing about a milliwatt of power while consuming about a kilowatt of power to run the reactor. It is nuclear power without highly radioactive nuclear waste.

He-3 Good – AT: Fusion Weapons

The tech for fusion weapons doesn’t exist

Franceschini & Schaper 6 (Giorgio and Annette, Peace Research Institute Frankfurt, Nuclear Weapons Research and Modernization Without Nuclear Testing Pg. 21 JF)

The primary role that is assigned to NIF is to maintain the intellectual and technical competency of the U.S. in physics related to nuclear weapons in a more generic sense.31 There are external critics who exaggerate the military potential of the ICF, some even fear that it may lead to the development of pure fusion weapons.32 It is unclear whether a pure fusion weapon explosion would be banned by the CTBT because no fission would take place. While the explosion during an ICF experiment is indeed a pure fusion explosion, it is extremely unlikely that a pure fusion nuclear weapon would be possible. The reason is that the release of any significant fusion energy requires an energy input of the highest density. In the foreseeable future, this is possible only with a fission bomb or with high power lasers.33 The latter are huge and bulky. A laser with such high energy that could be delivered like a weapon seems impossible today.34

He-3 Good – AT: Environment Damage

**There are no environmental impacts in mining**

Kulcinski et. al. 92 (G., Wisconsin Center for Space Automation and Robotics, E. Cameron, W. Carrier, H. Schmitt, January, http://fti.neep.wisc.edu/pdf/wcsar9201-5.pdf, accessed 7-9, JG)

The potential detrimental effects of 3He mining fall into three categories: (a) visual effects, (b) effects on the lunar atmosphere, (c) and the disposal of non-recyclable solid wastes. The current analysis shows that the level of mining for the first 35 yea's after the start of commercial use of 3He, will not contribute substantially to any detrimental surface changes visible from the Earth, even with the most powerful telescopes of today. Likewise, the release of even 1% of the mined lunar volatiles will not cause any major permanent change in the lunar atmospheric composition nor in its magnitude. The disposal of solid wastes can be done in a manner which is truly permanent in nature and without contamination of other important historical and scientific sites. There appear to be no major environmental problems associated with the extraction of lunar volatiles and when the benefits of using the low neutron cycle fuel on Earth are considered, it is expected that the net environmental effects will be strongly positive for the use of 3He.

**Mining doesn’t affect the Moon – regolith extraction is discharged immediately**

Bilder 9 (Richard, Law @ Univ. Wisconsin, 10-8, http://www.law.wisc.edu/m/wndnj/bilder1489273mining\_helium-3ftns.pdf, accessed 7-9, JG)

Since He-3 is believed to comprise only a small proportion of the lunar regolith, it will probably be necessary to process large amounts of lunar regolith in order to obtain the quantities of He-3 necessary to sustain a large-scale terrestrial He-3 based power program. However, since the regolith will be discharged back to the Moon's surface immediately after processing, the extraction of He-3 and other solar wind components from the lunar soil seems in itself unlikely to have a significant detrimental impact on the lunar environment or landscape.

He-3 Good – AT: Dust

Landing on the moon doesn’t raise dust-NASA experiment proves

The Guardian 9 (Ian Sample, science correspondent, 10-10, <http://www.guardian.co.uk/science/2009/oct/10/nasa-lunar-crash-landing>, 7-9-11, SRF)

Nasa's hope of filming a spectacular crash on the moon was dashed satellite and telescope imagery failed to record the enormous plume of rock and dust that scientists had predicted. The US space agency steered two parts of a spacecraft, called LCROSS, into the moon at more than 5,600 miles per hour, in the final act of a hunt for signs of water. Nasa scientists had anticipated that the impact would throw up a six-mile-high cloud of lunar dust and rock which could be scanned for evidence of frozen water. But after the collision at 12.31pm today, no sign of the plume was spotted, even from the second stage, which crashed nearby four minutes later. Nasa's headquarters in Washington DC had faced a flood of calls from people objecting to the agency "bombing" the moon, fearing disruption to tides on Earth and even their menstrual cycles. Anthony Colaprete, principal investigator on the LCROSS mission, said of the missing plume: "We haven't been able to see it clearly in our data yet." He added that scientists were working "feverishly" on information sent back.

He-3 Good – AT: Aliens Turn

There are no atmospheric effects from mining

Kulcinski et. al. 92 (G., Wisconsin Center for Space Automation and Robotics, E. Cameron, W. Carrier, H. Schmitt, January, http://fti.neep.wisc.edu/pdf/wcsar9201-5.pdf, accessed 7-9, JG)

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He-3 Good – AT: Private CP

Their solvency evidence concludes that government & private industry working together solves best – private industry can’t do it alone

Kazantis et. al. 6(Nikolaos, John Wilkes, Bachelor Sciences @ Worcester Polytechnic Institute, 2-17, http://www.wpi.edu/Pubs/E-project/Available/E-project-031306-122626/unrestricted/IQP.pdf, accessed 7-4, JG)

The weighs and the criteria for evaluation used in Table 7 depict Dr. Schmitt’s principles and values and hence represent only one point of view. Though it is possible that Dr. Schmitt has in fact gathered data from the corresponding sectors, this is not 71 evident from his text. Regardless of the weighing distribution and the total that Dr. Schmitt arrives to, the issues he presents are relevant and should be evaluated in depth for any commercial enterprise of the size of lunar He-3 mining. For example, the ability of private sectors to successfully introduce new technology into an existing market place gives the private sector a competitive advantage in development. However, the private sector has a very significant obstacle to overcome, capital investment. Unlike the government sector that has the power and resources to engage in monumental enterprises through specialized agencies, the private sector is subject to larger financial liability and is more reluctant to invest in risky ventures. Nonetheless, the potential for a technology spinoff, given a weighting of 1 under Schmitt’s scheme, is a valuable asset for risk taking entrepreneurs. Because the strengths of the private sector do not overlap with the strengths of the government sector, and in fact these two sectors complement each other in terms of capital and efficiency, a joined private-government initiative would be very likely. Such an initiative is not without precedents; technology spinoffs of the Apollo missions led to a huge boom in the aeronautics industry to the point that NASA now flies aircraft manufactured by components made in commercial industries.

He-3 Good – AT: OST

OST will collapse—too broad to be effective and states are uncertain about its effectiveness.

Quinn 8(Adam G. U. Mn. Law School, “The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space,” 2008, accessed 7-9, CJQ)

When the Outer Space Treaty was drafted the dominant view was that it barred all property rights, including those of private actors and patents. That view has lost support over time as the changing international environment recognized the necessity to allow some property rights in space. Regardless, the damage was done. The fact that property rights could dramatically change without the treaty text changing indicated one thing: uncertainty. Uncertainty is anathema to investment. The Outer Space Treaty claims to apply to all actors through all of space. Over time, however, the definitions of both actor and space have come under flux. During this time,  [\*491]  domestic courts have been reluctant to make statements regarding outer space. Although courts have been willing to extend jurisdiction of United States patent law to cover infringement aboard "American vessels on the high seas," they have been unwilling to extend that same principle to United States vessels in outer space. Although the comparison is strikingly clear, courts have stated that they are awaiting a clear signal from Congress regarding extraterritorial applications of patent law. Moreover, international courts have never enforced Article I against any nation.The lack of faith in the Outer Space Treaty is as great as its purported breadth, making it an insufficient base to develop a substantive set of space laws.

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