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### Inherency

#### Observation One: Inherency

#### Nuclear renaissance now – US subsidizing the industry

Worthington 12 (David Worthington, February 9, 2012, The U.S. nuclear renaissance has begun , Smart Planet, <http://www.smartplanet.com/blog/intelligent-energy/the-us-nuclear-renaissance-has-begun/13058>) JD

There are cooling towers on the horizon in the United States. The nuclear renaissance is slated to begin in rural Georgia with new reactors being built over the next five years, and work is already underway to leap another generation ahead. The Nuclear Regulatory Commission (NRC) today announced that it has granted licenses to a consortium of utilities to erect two [Westinghouse AP 1000](http://www.ap1000.westinghousenuclear.com/%22%20%5Ct%20%22_blank) reactors at Southern Company’s existing Vogtle site, clearing a path to end a decades long hiatus in new construction. Westinghouse’s design incorporates passive cooling, which extends the duration under which a reactor can operate safely without outside intervention in the event of a disaster. The AP 1000 is classified as Generation III+ reactor. Generation III+ reactors have more [redundant systems](http://www.smartplanet.com/blog/intelligent-energy/americas-nuclear-future/6946%22%20%5Ct%20%22_blank) than older reactor designs. Those include emergency cooling systems, a double containment system, and an ashtray like cooling area to capture molten fuel in the event of a meltdown. Existing U.S. nuclear reactors require active cooling such as electric water pumps. Japan’s Fukushima used active cooling, and its reactors melted down last spring when external power was unavailable. There are a total of 104 nuclear plants in the U.S today that are dependent upon active cooling. The meltdown risk associated with those legacy reactors and the high capital requirements of nuclear power are some of the reasons why no new reactor has been built in the U.S since the late 1970’s, when the 1979 Three Mile Island incident soured public sentiment. For now, anti-nuclear sentiment has been marginalized. The U.S. is energy hungry and nuclear power is receiving generous government subsidies. The Vogtle reactors would power up to 1 million homes at a cost of US$14 billion, CNN [reported.](http://money.cnn.com/2012/02/08/news/economy/nuclear_reactors/index.htm?hpt=hp_t3" \t "_blank)

#### But, the US is not reversing course on reprocessing.

Saillan 10 (Charles, attorney with the New Mexico Environment Department, Harvard Environmental Law Review, 2010, “DISPOSAL OF SPENT NUCLEAR FUEL IN THE UNITED STATES AND EUROPE: A PERSISTENT ENVIRONMENTAL PROBLEM”, Vol. 34, RSR)

The U.S. government’s position on reprocessing changed in 1974 when India exploded a nuclear weapon in the state of Rajasthan. 150 The weapon’s plutonium was isolated with reprocessing equipment imported for “peaceful purposes.” 151 Rightly concerned about the dangers of nuclear proliferation, President Ford announced that the United States would no longer view reprocessing as a necessary step in the nuclear fuel cycle. He called on other nations to place a three-year moratorium on the export of reprocessing technology. 152 In 1977, President Carter indefinitely deferred domestic efforts at reprocessing and continued the export embargo. 153 Although President Reagan reversed the ban on domestic reprocessing in 1981, 154 the nuclear industry has not taken the opportunity to invest in the technology. In 2006, the George W. Bush Administration proposed a Global Nuclear Energy Partner ship (“GNEP”) for expanded worldwide nuclear power production. 155 As a key component of the GNEP proposal, the United States would provide other nations with a reliable supply of nuclear fuel, and it would take back the spent fuel for reprocessing at a commercial facility in the United States, thus avoiding the spread of reprocessing technology. 156 However, the Obama Administration substantially curtailed GNEP in 2009, and is “no longer pursuing domestic commercial reprocessing.” 157

### Observation 2

#### Observation Two: Waste

#### In the short term US nuclear waste is stored on-site.

Galbraith 11 (Kate, Staff Writer, “A New Urgency to the Problem of Storing Nuclear Waste”, New York Times, 11-27-11, http://www.nytimes.com/2011/11/28/business/energy-environment/a-new-urgency-to-the-problem-of-storing-nuclear-waste.html, RSR)

Other countries are also looking at waste in new ways in the post-Fukushima world. Right now, worldwide, most spent fuel waste is stored on the site of the facility that produced it, in spent-fuel pools and, after it eventually cools, dry casks. Experts say dispersed storage is expensive and that central storage would be more secure. Few countries , apart from Sweden and Finland, have moved forward on centralized disposal sites, deep in the earth, designed to hold the waste permanently. France is evaluating a permanent disposal site for spent fuel , near the remote northeastern village of Bure.

#### On-site storage is dangerous – storage pools are vulnerable to accidents.

Alvarez 12 (Robert, Senior Scholar at IPS, where he is currently focused on nuclear disarmament, environmental, and energy policies, “Improving Spent-Fuel Storage at Nuclear Reactors”, Winter, ISSUES IN SCIENCE AND TECHNOLOGY, RSR)

Until the NAS completes its study, if it agrees to do so, the bulk of current attention is focused on the NRC’s analysis of the Fukushima disaster. As in Japan, U.S. spent-fuel pools are not required to have defense-in-depth nuclear safety features. They are not covered by the types of heavy containment structures that cover reactor vessels. Reactor operators are not required have backup power supplies to circulate water in the pools and keep them cool in the event of onsite power failures. Reactor control rooms rarely have instrumentation keeping track of the pools’ water levels and chemistry. (In one incident at a U.S. reactor, water levels dropped to a potentially dangerous level after operators simply failed to look into the pool area.) Some reactors may not have the necessary capabilities to restore water to pools when needed. Quite simply, spent-fuel pools at nuclear reactors are not required to have the same level of nuclear safety protection as required for reactors, because the assumption was that they would be used only for short-term storage before the rods were removed for reprocessing or permanent storage. In its interim report, the NRC task force recognized these shortcomings and recommended that the NRC order reactor operators to: • “. . . provide sufficient safety-related instrumentation, able to withstand design-basis natural phenomena, to monitor key spent fuel pool parameters (i.e., water level, temperature, and area radiation levels) from the control room.” • “. . . revise their technical specifications to address requirements to have one train of onsite emergency electrical power operable for spent fuel pool makeup and spent fuel pool instrumentation when there is irradiated fuel in the spent fuel pool, regardless of the operational mode of the reactor.” • “. . . have an installed seismically qualified means to spray water into the spent fuel pools, including an easily accessible connection to supply the water (e.g., using a portable pump or pumper truck) at grade outside the building.” Improving pool safety is certainly important. For decades, nuclear safety research has consistently pointed out that severe accidents could occur at spent-fuel pools that would result in catastrophic consequences. A severe pool fire could render about 188 square miles around the nuclear reactor uninhabitable, cause as many as 28,000 cancer fatalities, and cause $59 billion in damage, according to a 1997 report for the NRC by Brookhaven National Laboratory. If the fuel were exposed to air and steam, the zirconium cladding around the fuel would react exothermically, catching fire at about 800 degrees Celsius. Particularly worrisome are the large amounts of cesium-137 in spent-fuel pools, because nearly all of this dangerous isotope would be released into the environment in a fire, according to the NRC. Although it is too early to know the full extent of long-term land contamination from the accident at the Dai-Ichi station, fragmentary evidence has been reported of high cesium-137 levels as far away as metropolitan Tokyo. The NRC also has reported that spent-fuel fragments were found a mile away from the reactor site. The damage from a large release of fission products, particularly cesium-137, was demonstrated at Chernobyl. More than 100,000 residents from 187 settlements were permanently evacuated because of contamination by cesium-137. The total area of this radiation-control zone is huge: more than 6,000 square miles, equal to roughly two-thirds the area of New Jersey. During the following decade, the population of this area declined by almost half because of migration to areas of lower contamination.

#### The densely packed fuel is enough to trigger a full scaled meltdown – Fukushima proves.

Kinitisch 11 (Eli, Reporter at Science Magazine, “Waste Panel Expected To Back Interim Storage”, Science Magazine, Vol. 333, 7-8-11, RSR)

In any case, experts agree, some new plan for waste storage is essential. Waste currently stored in pools and casks at U.S. sites does not pose “unmanageable … safety or security risks,” says a subcommittee report. But every ton that stays at reactor sites makes those risks slightly greater. Fuel in U.S. spent fuel pools is packed four times as densely as it was 25 years ago, raising concerns about the risk of explosions or meltdown if the pools were to empty in an accident. The tsunami that devastated the Fukushima nuclear plant in Japan in March may have resulted in a loss of water in one of its ponds (Science, 1 April, p. 24). A draft commission report says the issue of the safety of keeping fuel densely packed in pools should be “reexamined,” although “it is still too early to draw deﬁ nitive conclusions” from the Fukushima accident. It calls for an expert panel at the National Academies to tackle the subject.

#### These catastrophic meltdowns cause extinction – reactors contain 100x the radiation of nuclear bombs.

Lendman 11 (Stephen, Research Associate of the Centre for Research on Globalization,

03/ 13, “Nuclear Meltdown in Japan,”, The People’s Voice <http://www.thepeoplesvoice.org/TPV3/Voices.php/2011/03/13/nuclear-meltdown-in-japan>, accessed 8-2-12, RSR)

Reuters said the 1995 Kobe quake caused $100 billion in damage, up to then the most costly ever natural disaster. This time, from quake and tsunami damage alone, that figure will be dwarfed. Moreover, **under a worst case** core **meltdown, all bets are off as the entire region and beyond will be threatened with permanent contamination**, making the most affected areas unsafe to live in. On March 12, Stratfor Global Intelligence issued a "Red Alert: Nuclear Meltdown at Quake-Damaged Japanese Plant," saying: Fukushima Daiichi "nuclear power plant in Okuma, Japan, appears to have caused a reactor meltdown." Stratfor downplayed its seriousness, adding that such an event "does not necessarily mean a nuclear disaster," that already may have happened - the ultimate nightmare short of nuclear winter. According to Stratfor, "(A)s long as the reactor core, which is specifically designed to contain high levels of heat, pressure and radiation, remains intact, the melted fuel can be dealt with. If the (core's) breached but the containment facility built around (it) remains intact, the melted fuel can be....entombed within specialized concrete" as at Chernobyl in 1986. In fact, that disaster killed nearly one million people worldwide from nuclear radiation exposure. In their book titled, "Chernobyl: Consequences of the Catastrophe for People and the Environment," Alexey Yablokov, Vassily Nesterenko and Alexey Nesterenko said: "For the past 23 years, it has been clear that there is a danger greater than nuclear weapons concealed within nuclear power. **Emissions from** this **one reactor** exceeded a hundred**-fold the radioactive contamination of** the bombs dropped on **Hiroshima and Nagasaki.**" "**No** citizen of any **country** can be assured that he or she **can be protected from radioactive contamination. One nuclear reactor can pollute half the globe.** Chernobyl fallout covers the entire Northern Hemisphere." Stratfor explained that if Fukushima's floor cracked, "it is highly likely that the melting fuel will burn through (its) containment system and enter the ground. This has never happened before," at least not reported. If now occurring, "containment goes from being merely dangerous, time consuming and expensive to nearly impossible," making the quake, aftershocks, and tsunamis seem mild by comparison. Potentially, millions of lives will be jeopardized. Japanese officials said Fukushima's reactor container wasn't breached. Stratfor and others said it was, making the potential calamity far worse than reported. Japan's Nuclear and Industrial Safety Agency (NISA) said the explosion at Fukushima's Saiichi No. 1 facility could only have been caused by a core meltdown. In fact, 3 or more reactors are affected or at risk. Events are fluid and developing, but remain very serious. The possibility of an extreme catastrophe can't be discounted. Moreover, independent nuclear safety analyst John Large told Al Jazeera that by venting radioactive steam from the inner reactor to the outer dome, a reaction may have occurred, causing the explosion. "When I look at the size of the explosion," he said, "it is my opinion that there could be a very large leak (because) fuel continues to generate heat." Already, Fukushima way exceeds Three Mile Island that experienced a partial core meltdown in Unit 2. Finally it was brought under control, but coverup and denial concealed full details until much later. According to anti-nuclear activist Harvey Wasserman, Japan's quake fallout may cause nuclear disaster, saying: "This is a very serious situation. **If the cooling system fails** (apparently it has at two or more plants), the super-heated **radioactive fuel rods will melt**, and (if so) you could conceivably have an explosion," that, in fact, occurred. As a result, **massive radiation releases may follow**, impacting the entire region. "**It could be**, literally, **an apocalyptic event.**

#### On-site waste storage is the EASIEST target for a terrorist attack – it’s the most vulnerable.

Rogers 6 (Ken, Professor and Chair of the Political Science Department at Coastal Carolina University, “Radioactive Waste Storage/Disposal Policy: A Paradigm for Homeland Security and Energy Security”, Midsouth Political Science Review, 2006, Vol. 8, RSR)

The inability of U.S. policymakers to come to grips with the problem of what to do with the continued generation of radioactive waste has both homeland security and energy security implications. Clearly, the events of 9/11 have focused attention on the potential for a terrorist attack on nuclear facilities. While much of this concern has been directed towards an attack on the reactors themselves, the radioactive waste stored on-site – especially the waste stored outdoors above ground in dry casks – is more problematic since it is far more vulnerable to any terrorist assault. Thus, the major terrorist threat to nuclear power facilities is not to the reactors, but the radioactive waste that they generate.

#### On site storage vulnerable to terrorist theft – fewer security measures due to assumed radioactive safeguards.

Bunn 9 (Matthew, Associate Professor at Harvard University's John F. Kennedy School of Government, “Reducing the greatest risks of nuclear theft & terrorism”, Daedalus, American Academy of Arts and Sciences, Fall, RSR)

A building with nuclear material that terrorists could readily make into a nuclear bomb needs more security than a building with lower-quality material that would be very difficult for adversaries to use to make a bomb. But this sensible “graded safeguards” approach, used in national regulations and international recommendations around the world, must avoid slipping into what might be called “cliffed safeguards,” in which security falls off catastrophically if nuclear material is beyond some arbitrary threshold that has little relation to real risk. For example, under current Nuclear Regulatory Commission (nrc) rules in the United States, nuclear material that would normally require security measures costing millions of dollars a year requires none of that if it is radioactive enough to cause a radiation dose of one Sievert per hour at one meter– a level considered radioactive enough to make the material “self-protecting.” But studies at the national laboratories have shown that at this level of radiation, thieves who carried the material out to a waiting truck with their bare hands would not even receive a big enough dose of radiation to make them feel sick. In a world of suicidal terrorists, these rules–and similar, though less extreme, international rules– urgently need to be revised. More broadly, in-depth assessments of how different chemical, physical, isotopic, and radiological properties of a material affect the odds that adversaries would succeed in making a bomb from it should be used to determine how much security can be relaxed for particular types of material while keeping overall risks low. In making these assessments, it is important to remember that heu at enrichment levels far below the 90 percent U-235 level considered “weapons grade” can still readily be used in a bomb, at the cost of using somewhat more material. So past policies that have focused cooperative security upgrades only on sites whose heu is at least 80 percent U-235 should certainly be revised. Similarly, while weapons designers prefer weapons-grade plutonium, produced specifically to contain 90 percent or more Pu-239, the “reactor grade” plutonium produced in the spent fuel from typical power reactors can also be used to make fearsome explosives, despite the extra neutrons, heat, and radiation generated by the less desirable plutonium isotopes it contains. Indeed, repeated government studies have concluded that any state or group capable of making a bomb from weapons-grade plutonium would also be able to make a bomb from reactor-grade plutonium. 6

#### Nuclear terrorism is likely and causes extinction – security experts agree.

Rhodes 9 (Richard, affiliate of the Center for International Security and Cooperation at Stanford University, Former visiting scholar at Harvard and MIT, and author of “The Making of the Atomic Bomb” which won the Pulitzer Prize in Nonfiction, National Book Award, and National Book Critics Circle Award, “Reducing the nuclear threat: The argument for public safety” 12-14, <http://www.thebulletin.org/web-edition/op-eds/reducing-the-nuclear-threat-the-argument-public-safety>, RSR)

The response was very different among nuclear and national security experts when Indiana Republican Sen. Richard Lugar surveyed PDF them in 2005. This group of 85 experts judged that the possibility of a WMD attack against a city or other target somewhere in the world is real and increasing over time. The median estimate of the risk of a nuclear attack somewhere in the world by 2010 was 10 percent. The risk of an attack by 2015 doubled to 20 percent median. There was strong, though not universal, agreement that a nuclear attack is more likely to be carried out by a terrorist organization than by a government. The group was split 45 to 55 percent on whether terrorists were more likely to obtain an intact working nuclear weapon or manufacture one after obtaining weapon-grade nuclear material. "The proliferation of weapons of mass destruction is not just a security problem," Lugar wrote in the report's introduction. "It is the economic dilemma and the moral challenge of the current age. On September 11, 2001, the world witnessed the destructive potential of international terrorism. But the September 11 attacks do not come close to approximating the destruction that would be unleashed by a nuclear weapon. Weapons of mass destruction have made it possible for a small nation, or even a sub-national group, to kill as many innocent people in a day as national armies killed in months of fighting during World War II. "The bottom line is this," Lugar concluded: "For the foreseeable future, the United States and other nations will face an existential threat from the intersection of terrorism and weapons of mass destruction." It's paradoxical that a diminished threat of a superpower nuclear exchange should somehow have resulted in a world where the danger of at least a single nuclear explosion in a major city has increased (and that city is as likely, or likelier, to be Moscow as it is to be Washington or New York). We tend to think that a terrorist nuclear attack would lead us to drive for the elimination of nuclear weapons. I think the opposite case is at least equally likely: A terrorist nuclear attack would almost certainly be followed by a retaliatory nuclear strike on whatever country we believed to be sheltering the perpetrators. That response would surely initiate a new round of nuclear armament and rearmament in the name of deterrence, however illogical. Think of how much 9/11 frightened us; think of how desperate our leaders were to prevent any further such attacks; think of the fact that we invaded and occupied a country, Iraq, that had nothing to do with those attacks in the name of sending a message.

#### In the long term, waste will be stored at Yucca – only option.

Tollefson 11 (Jeff, former Knight fellow in science journalism at MIT, “Battle of Yucca Mountain rages on”, Nature, Vol. 473, No. 266, 5-19-11, RSR)

The commission intends to issue a draft report in July and a final one next January. With its recommendations in hand, the administration is expected to propose legislation that would establish a new process for identifying nuclear waste storage sites. Yet such a process could well take decades, the GAO report concludes, and the government’s reversal at Yucca Mountain could serve to galvanize public opposition at other candidate sites. Since the debate began, “no states have expressed an interest in hosting a permanent repository for this spent nuclear fuel ... including the states with sites currently storing the waste”, the report adds. The commission’s scheme for an interim storage facility may prove no more appealing, given fears that ‘interim’ means permanent as long as the present impasse continues. Such fears have in the past halted interim storage proposals in states such as Wyoming. And even if one community decides that it is willing to play host to the waste, that doesn’t mean others won’t challenge nuclear-waste transportation routes. Nevertheless, the nation will need to find a permanent repository at some point, and Yucca Mountain, it seems, is down but not out. “Yucca Mountain has nine lives,” says Ed Davis, a nuclear consultant who heads the Pegasus Group in Washington DC. “And nobody knows how many lives have been used up.”

#### Yucca explosion is likely - earthquakes, volcanoes, and ground water

Warrick 98 (Joby, Staff, At Nevada Nuclear Waste Site, The Issue Is One of Liquidity; Studies Citing Risk of Water Seepage Imperil Yucca Mountain Project, The Washington Post, December 15, p. A3)

More recent studies raised different kinds of concerns. A report in March by the California Institute of Technology found new evidence of geological instability in the region, including relatively rapid shifting of the Earth's crust near the mountain. The movement raises the probability of future earthquakes or volcanic eruptions.¶ And last week, a Russian geologist claimed that hot water from deep underground had flooded the mountain at least once in the geologically recent past. Yuri V. Dublyansky, of the Siberian branch of the Russian Academy of Sciences, said flooding could happen again, with potentially calamitous results.¶ "We can be reasonably sure that Yucca Mountain was at some point in the past saturated with water. The crucial question is when," said Dublyansky, who obtained rock samples from inside the mountain while working for Nevada state officials who hope to defeat the project. "Any decision on whether Yucca Mountain should be a repository for nuclear waste should be preceded by a resolution of that question."¶ The evidence of past flooding comes from crystals of calcite and other minerals that were formed when the mountain was already old, said Dublyansky, now a research fellow for the Maryland-based Institute for Energy and Environmental Research. Microscopic bubbles inside the rocks, known as "fluid inclusions," prove that the crystals were formed in the presence of hot water -- which could only have come from underground thermal springs, Dublyansky said.¶ At his request, the findings were reviewed by independent scientists from Austria, Great Britain and Nevada -- all of whom backed his basic conclusions. But U.S. government scientists ridiculed Dublyansky's research as unscholarly. "We are disturbed," said Joe Whelan of the U.S. Geological Survey in a written critique, "by Dr. Dublyansky's shrewd and nonscientific arguments that seem to be crafted for readers unfamiliar with the specific Yucca Mountain geologic relations."¶ Szymanski, the former Energy Department geologist, also had argued that a thermal upwelling had occurred at Yucca Mountain and sees the new evidence as vindication. He thinks a combination of water and the red-hot temperatures of the nuclear waste casks could spark an explosion that could spew lethal doses of radiation into the atmosphere.¶ "This is direct evidence," Szymanski said. "And if anybody doubts the results, they can go back and measure them again. They're very easy to verify."

#### Yucca explosion results in extinction – top geologists agree.

Broad 90 (William, NYT Staff, The New York Times, November 18)

One scientist, however, has quietly but persistently warned that this vision of a safe repository is little more than a delusion.¶ Jerry S. Szymanski (pronounced sha-MAN-ski) is a geologist who works on the Yucca Mountain project for the United States Department of Energy, which is in charge of evaluating the site and would run the repository. For years, he has argued that ground water under the mountain could eventually well up, flood the facility and prompt a calamity of vast proportions. The geological action is easy to visualize. Crustal stresses in the area slowly open fractures and faults under and within the mountain. Water seeps into them. An earthquake occurs, compressing the fractures and forcing the ground water upward into the dump. As the inrushing water comes into contact with the hot canisters of nuclear waste, the water is vaporized, threatening to cause explosions, ruptures and the release of radioactivity.¶ Szymanski has worked for the D.O.E. since 1983. He takes pains to distance himself from foes of nuclear power. "This report is not the act of a disgruntled employee or an antinuclear freak," he wrote in the preface of a study he made on Yucca Mountain. "Rather, it is the act of a deeply concerned scientist, a public servant and a pro-nuclear activist."¶ He chain-smokes Winstons and drinks Scotch, neither of which seems to impair his ability to take brisk hikes up the mountain with his dog Max, a fierce-looking but friendly creature that is half Labrador, half pit bull. Szymanski's eyes flash when he speaks of those who oppose his view of the evidence. "It's banality of thought," he growls, "absence of depth." That same kind of banality, he says, was responsible for the Holocaust, around which his earliest memories revolve, and for a brutal crackdown in his native Poland, which prompted him to flee that country two decades ago with his wife and 6-month-old son. Today, he says, banality is prompting the Federal Government to court disaster.¶ Squinting in the bright Nevada sunlight, a cigarette firmly in his mouth, Szymanski walks into Trench No. 8, a deep scar on the side of Yucca Mountain dug at the behest of the Energy Department. It runs across a fault. He bends down to examine a one-yard-wide vein of rock whose creamy color stands in contrast to the dark, surrounding earth tones. His fingers play over its surface. The vein was deposited, he says, by mineral-laden water that welled up and turned this desolate site into an oasis.¶ "This is above the repository level," he says with studied understatement. The implication is clear and troubling -- where water once flowed, it might flow again.¶ The repository would hold up to 70,000 metric tons of waste. A large release would have an environmental impact that, by some estimates, would exceed that of a nuclear war. For perspective, the explosion of the Chernobyl reactor in the Soviet Union shot into the atmosphere just a few dozen pounds of highly radioactive nuclear waste, one of the most dangerous components of which was cesium 137 (it would also be a significant part of the waste at Yucca Mountain). Various studies say the consequences of Chernobyl will eventually be somewhere between 17,000 and 475,000 deaths from cancer, as well as an alarming number of serious ailments.¶ For half a decade, Szymanski's was a lone voice. His grim appraisal was opposed by almost everyone else on the Yucca Mountain project, who let their displeasure be known in subtle and not-so-subtle ways. But recently, growing ranks of geologists have backed his view. The dispute is by no means resolved.¶ If Szymanski is right and his warnings are heeded, it could mark the end of the Yucca Mountain project. The retreat would be a stunning setback for the Government and the nuclear-power industry, which is poised for a revival. If he is right and his warnings go unheeded, some experts say it might be the beginning of the ultimate end.¶ "You flood that thing and you could blow the top off the mountain," says Charles B. Archambeau, a geophysicist at the University of Colorado who has reviewed Szymanski's work and found it persuasive. "At the very least, the radioactive material would go into the ground water and spread to Death Valley, where there are hot springs all over the place, constantly bringing water up from great depths. It would be picked up by the birds, the animals, the plant life. It would start creeping out of Death Valley. You couldn't stop it. That's the nightmare. It could slowly spread to the whole biosphere. If you want to envision the end of the world, that's it."

#### Reprocessing would remove the waste problem – the waste we currently store can be reused

Bastin 8 (Clinton, Former Chemical Engineer at the Atomic Energy Commission, 21st Century Science and Technology, “We Need to Reprocess Spent Nuclear Fuel, And Can Do It Safely, At Reasonable Cost”, 2008, [http://www.21stcenturysciencetech.com/Articles%202008/ Summer\_2008/Reprocessing.pdf](http://www.21stcenturysciencetech.com/Articles%202008/Summer_2008/Reprocessing.pdf), RSR)

The concept of used nuclear fuel as “nuclear waste” is a fiction created by the opponents of nuclear energy. Used nuclear fuel isn’t waste at all, but a renewable resource that can be reprocessed into new nuclear fuel and valuable isotopes. When we entered the nuclear age, the great promise of nuclear energy wasitsrenewability, making it an inexpensive and efficient way to produce electricity. It was assumed that the nations making use of nuclear energy would reprocess their spent fuel, completing the nuclear fuel cycle by recycling the nuclear fuel after it was burned in a reactor, to extract the 95 to 99 percent of unused uranium in it that can be turned into new fuel. This means that if the United States buries its 70,000 metric tons of spent nuclear fuel, we would be wasting 66,000 metric tons of uranium-28, which could be used to make new fuel. In addition, we would be wasting about 1,200 metric tons of fissile uranium-25 and plutonium-29, which can also be burned as fuel. Because of the high energy density in the nucleus, this relatively small amount of U.S. spent fuel (it would fit in one small house) is equivalent in energy to about 20 percent of the U.S. oil reserves. About 96 percent of the spent fuel the United States is now storing can be turned into new fuel. The 4 percent of the socalled waste that remains—2,500 metric tons—consists of highly radioactive materials, but these are also usable. There are about 80 tons each of cesium-17 and strontium-90 that could be separated out for use in medical applications, such as sterilization of medical supplies. Using isotope separation techniques, and fast-neutron bombardment for transmutation (technologies that the United States pioneered but now refuses to develop), we could separate out all sorts of isotopes, like americium, which is used in smoke detectors, or isotopes used in medical testing and treatment. Right now, the United Statesmust import 90 percent of its medical isotopes, used in 40,000 medical procedures daily. The diagram shows a closed nuclear fuel cycle. At present, the United States has no reprocessing, and stores spent fuel in pools or dry storage at nuclear plants. Existing nuclear reactors use only about 1 percent of the total energy value in uranium resources; fast reactors with fuel recycle would use essentially 100 percent, burning up all of the uranium and actinides, the long-lived fission products. In a properly managed and safeguarded system, the plutonium produced in fast reactors would remain in its spent fuel until needed for recycle.Thus, there need be no excess buildup of accessible plutonium. The plutonium could also be fabricated directly into new reactor fuel assemblies to be burned in nuclear plants.

#### Reprocessing solves the blow up of Yucca Mountain.

Broad 95 (William, NYT staff, Scientists fear atomic explosion of buried waste, The New York Times, March 5, p. 1)

Dr. Bowman says the explosion thesis is alive and well. On Friday he finished an 11-page draft paper thick with graphs and equations that lays it out in new detail.¶ The team criticisms, he said in an interview, repeatedly fall flat. For instance, dispersal could happen relatively quickly, especially if water percolated through the dump. Even if slow, plutonium 239 decays into uranium 235, which harbors the same explosive risks but requires millions of years to decay into less dangerous elements.¶ So too with the other criticisms, he says. Water could aid the slowing of neutrons and make sure the reaction went forward rather than automatically slowing down. And a pile could explode, he insists, while conceding that the blast from a single one might have a force of a few hundred tons of high explosive rather than the thousand or more originally envisioned.¶ On the other hand, his new paper says plutonium in amounts as small as one kilogram, or 2.2 pounds, could be dangerous.¶ "We got some helpful criticism and that, combined with additional work, has made our thesis even stronger," he said.¶ The most basic solution, Dr. Bowman said, would be removing all fissionable material from nuclear waste in a process known as reprocessing or by transmuting it in his proposed accelerator. Other possible steps would include making steel canisters smaller and spreading them out over larger areas in underground galleries -- expensive steps in a project already expected to cost $15 billion or more.¶ A different precaution, Dr. Bowman said, would be to abandon the Yucca site, where the volcanic ground is relatively soluble. Instead, the deep repository might be dug in granite, where migration of materials would be slower and more difficult.

### Observation 3

#### Observation Three: Peak oil

#### Peak oil coming soon – newest data proves.

Worstall 12 (Tim, Contributor, “Peak Oil is Here: Now What?”, Forbes, 5-2-12, http://www.forbes.com/sites/timworstall/2012/05/02/peak-oil-is-here-now-what/, RSR)

At least peak oil is here if I’ve understood what the peak oil argument is properly. And my problem with the peak oil argument is that it isn’t really very clear in itself as to what it means. From what I understand at some point we get to the end of cheap oil, we’ve only expensive oil left and then, well, and then apparently something terrible happens. But I’ve never been able to get from anyone a clear description of what it is that’s terrible that then happens. However, we seem to have actually reached that end of cheap oil part, at least we have if this analysis is true: Tracking data from the 50 largest listed oil and gas producing companies globally (ex FSU) indicates that cash, production and unit costs in 2011 grew at a rate significantly faster than the 10 year average. Last year production costs increased 26% y-o-y, while the unit cost of production increased by 21% y-o-y to US$35.88/bbl. This is significantly higher than the longer term cost growth rates, highlighting continued cost pressures faced by the E&P industry as the incremental barrel continues to become more expensive to produce. The marginal cost of the 50 largest oil and gas producers globally increased to US$92/bbl in 2011, an increase of 11% y-o-y and in-line with historical average CAGR growth. Assuming another double digit increase this year, marginal costs for the 50 largest oil and gas producers could reach close to US$100/bbl.

#### Reprocessing solves peak oil - nuclear energy can help hydrogen replace oil in the transportation sector.

Choppin 6 (Gregory, Robert O. Lawton Distinguished Professor of Chemistry at Florida State University, “Technology for Nuclear Reprocessing: Present and Future Directions”, Separation Science and Technology, 41: 1955–1963, 2006, RSR)

At present, internationally, nuclear power has reached a good level of scientific and institutional maturity. There are promising plans for significant developments in the nuclear fuel cycle as many nations have made decisions to advance with systems designed to increase the use of nuclear power. An important aspect of such increased nuclear power use is that it will supply electricity; however, it can also be used to provide hydrogen gas for transportation, water desalination, and other systems requiring significant amounts of energy. Coupled with this replacement of fossil fuel, there will be a global need for a significant increase in energy over the next 50 years as the world population has been predicted to double and, perhaps, even triple over that time. Even if the Greenhouse Effect is ignored, carbon fuel supplies cannot increase equally as oil production will decrease due to exhaustion of resources. The loss of oil will have drastic effects, particularly on transportation, unless hydrogen can be used to replace it. Production of adequate hydrogen for such use requires an amount of energy which can only be provided by nuclear power. To develop an adequate nuclear energy technology, it will be necessary to extend the availability of nuclear fuel into future centuries by recycling the fuel to recover the unfissioned material for further burning. This use of nuclear energy will have a positive impact on the environment through the displacement of polluting carbon-based energy by electrical generation from the nuclear plants and by the production of hydrogen from these plants. This will require geologic waste repositories to accept the waste for permanent disposal with no danger of release of the spent fuel material for millennia. Ensuring that repository performance is satisfactory for very long time periods (thousands of years) will require a reduction in the lifetime and the level of toxicity of the residual radioactive wastes placed in these repositories. Developments in the nuclear fuel cycle which would remove the long-lived radioactive fission products for other use would avoid their disposal in the repositories.

#### Reprocessing increases nuclear energy’s share in the market, displacing oil.

Szabo 10 (Aaron, J.D., George Washington University Law School; Financial Analyst, United States

Nuclear Regulatory Commission (NRC), 2010, “Reprocessing: The Future Of Nuclear Waste”, Temple Journal of Science, Technology & Environmental Law, Vol. 29, No. 2, RSR)

Energy independence has been a longstanding concern for the United States. Beginning with President Nixon's promise to make the United States energy independent by the end of the 1970s,1'5 every subsequent president has sought to move the country away from dependence on foreign countries for energy.' 52 Although the Energy Independence and Security Act of 2007 took a step toward energy independence and increased national security, the United States is currently more dependent on other countries for energy than ever before. Last year, the United States imported about half of its oil and 40.7 million pounds of uranium.15 3 According to President Obama, America's dependence on oil is one of the most serious threats that our nation has faced. It bankrolls dictators, pays for nuclear proliferation and funds both sides of our struggle against terrorism. It puts the American people at the mercy of shifting gas prices, stifles innovation, and sets back our ability to compete. Increasing the United States nuclear supply by creating a closed-loop fuel cycle can significantly decrease the United States' dependence on oil and fuel from other countries and provide the United States with more stability and independence from possible hostile countries.

#### Peak oil kills economic recovery – outweighs resiliency and safeguards.

Zakaria 12 (Fareed, host of CNN foreign affairs program, “Zakaria: Why oil prices keep rising”, http://globalpublicsquare.blogs.cnn.com/2012/03/09/zakaria-why-oil-prices-keep-rising/)

The rising price of oil is the single most serious threat to the global economic recovery, the U.S. economy and President Obama's reelection prospects. Right now, we are beginning to move into a pretty broad-based recovery. Manufacturing is rising for the first time in 25 years. Technology firms are doing very well. Retail is picking up. The green shoots of the housing recovery are emerging and that's very important because housing has led almost every recovery since World War II. . But all the while that you have this economic good news, you are beginning to see oil prices rise quite substantially. They're up about 15 percent over the last few months. And that could put a damper on all this good news. Why is the price of oil rising? It's happening for one reason, principally and that is geopolitical risk. There are fears of a war with Iran and fears that crippling sanctions on Iran would cut down Iranian oil exports almost entirely. If you look at demand for oil, it's just not that strong. Much of the world is in slower economic times than before. In January 2007, oil was $50 a barrel. It's now $110 a barrel. This doesn't make any economic sense unless you factor in geopolitical risk. So for oil prices to decline, there must be some resolution to the tensions with Iran. But there is a broader problem, which is that there just isn't that much oil on the market and demand is going to begin to rise again as many countries come out of their recessions and into recoveries. There isn't that much of what's called "spare capacity" - the ability to increase production quickly. The only ones who have it are Saudi Arabia and they are operating at their limits in some ways. So there are economic fundamentals that explain why oil prices are high - but not why they are so high. The reason they are so high is really Iran, Iran and Iran.

#### 40 year study proves oil key to the global economy

Li 12 (Mingqi, Econ professor at the University of Utah, ““Here's Why The Economy Is More Vulnerable Than Ever To Oil Price Shocks”, http://www.businessinsider.com/heres-why-the-economy-is-more-vulnerable-than-ever-to-oil-price-shocks-2012-3)

This paper examines the impact of oil price changes on global economic growth. Unlike some of the recent studies, this paper finds that oil price rises have had significant negative impact on world economic growth rates. A time-series analysis of the data from 1971 to 2010 finds that an increase in real oil price by one dollar is associated with a reduction of world economic growth rate by between 0.04 and 0.1% in the following year. Therefore, an increase in real oil price by 10 dollars would be associated with a reduction of world economic growth rate by between 0.4 and 1% in the following year. For a global economy that in average grows at about 3.5% a year, a reduction of this size is very significant. Moreover, the regressions seem to have suggested that the impact of oil price on economic growth may have increased over the last one or two decades. This is in contradiction with the widely held belief that the global economy has become less vulnerable to oil price shocks. These findings suggest that if the world oil production does peak and start to decline in the near future, it may impose a serious and possibly an insurmountable speed limit on the pace of global economic expansion.

#### Economic growth solves war

Royal 10 (Jeddiah, Director of Cooperative Threat Reduction at the U.S. Department of Defense, “Economic Integration, Economic Signalling And The Problem Of Economic Crises”, in Economics of War and Peace: Economic, Legal and Political Perspectives, ed. Goldsmith and Brauer, p. 213-215)

Second, on a dyadic level. Copeland's (1996. 2000) theory of trade expectations suggests that 'future expectation of trade' is a significant variable in understanding economic conditions and security behaviour of states. He argues that interdependent states are likely to gain pacific benefits from trade so long as they have an optimistic view of future trade relations. However, if the expectations of future trade decline, particularly for difficult to replace items such as energy resources, the likelihood for conflict increases, as states will be inclined to use force to gain access to those resources. Crises could potentially be the trigger for decreased trade expectations either on its own or because it triggers protectionist moves by interdependent states.4 Third, others have considered the link between economic decline and external armed conflict at a national level. Blomberg and Hess (2002) find a strong correlation between internal conflict and external conflict, particularly during periods of economic downturn. They write, The linkages between internal and external conflict and prosperity are strong and mutually reinforcing. Economic conflict tends to spawn internal conflict, which in turn returns the favour. Moreover, the presence of a recession lends to amplify the extent to which international and external conflicts self-rein force each other. (Blombcrj! & Hess. 2002. p. 89) Economic decline has also been linked with an increase in the likelihood of terrorism (Blomberg. Hess. & Weerapana, 2004). which has the capacity to spill across borders and lead to external tensions. Furthermore, crises generally reduce the popularity of a sitting government. "Diversionary theory" suggests that, when facing unpopularity arising from economic decline, sitting governments have increased incentives to fabricate external military conflicts to create a 'rally around the flag' effect. Wang (1996), DeRouen (1995), and Blombcrg. Mess, and Thacker (2006) find supporting evidence showing that economic decline and use of force are at least indirectly correlated. Gelpi (1997), Miller (1999). and Kisangani and Pickering (2009) suggest that the tendency towards diversionary tactics arr greater for democratic states than autocratic states, due to the fact that democratic leaders are generally more susceptible to being removed from office due to lack of domestic support. DeRouen (2000) has provided evidence showing that periods of weak economic performance in the United States, and thus weak Presidential popularity, are statistically linked to an increase in the use of force.

#### **Oil depletion causes resources wars**

Howard 9 (Roger, “Peak Oil and Strategic Resource Wars.” Futurist, 00163317, September/October 2009, Vol. 43, Issue 5) SH

At various points over the coming decades, many of **the world's key oil producers will be forced to accept** that **their worst nightmare** is no longer the stuff of dreams. **As existing wells start to run dry and new reserves prove increasingly elusive, the leaders in many oil-producing nations will have to confront the very real prospect of surviving without** the **resources** that have long bestowed fabulous wealth and prosperity upon their lands, many of which would otherwise be bleak and barren. At the very least, they are likely to grow more fearful of the future, even if these fears ultimately prove to be exaggerated.¶ **The economic and social impacts of diminishing oil revenues on producer countries will likely be powerful**. **Many exporting states, particularly in the Middle East, South America, and Africa, have booming populations** that in the years to come will impose an immense strain on their national infrastructures. If these countries fail to diversify their economies, then it is not easy to see how they will afford the housing, roads, schools, and job-creation schemes that future generations are likely to demand. **Saudi Arabia is already struggling** to reduce its rate of domestic unemployment, reckoned to stand at around 15%, and may well struggle even-more after around 2020, when its oil output is expected to reach a plateau. The prospect of "**resource wars**" has also been much discussed. **Conflict could break out**, it is sometimes said, **not only as consuming countries use their military weight to seize diminishing reserves of petroleum and other natural assets, but also between and within producing countries**. **Desperate to secure their future, these exporting nations, or factions within them, could** perhaps **try to stake their claim over disputed oil-rich regions or even blatantly disregard international law by attacking vulnerable neighbors. Current wars in western Africa** **illustrate how dangerous and bloody such conflicts might become**. But the political consequences of peak oil on producer countries are in fact likely to be much more far-reaching and complex. Growing fears about future output may drive these states to react in ways that could have adverse repercussions for local democracy and political freedom or increase tension with neighboring states in unexpected ways.

#### Resource wars cause extinction.

Lendman 7 (Stephen Lendman, Research Associate of the Centre for Research on Globalization, “Resource Wars - Can We Survive Them?,” Rense.com, 6-6-7, pg. http://www.rense.com/general76/resrouce.htm)

With the world's energy supplies finite, the US heavily dependent on imports, and "peak oil" near or approaching, "security" for America means assuring a sustainable supply of what we can't do without. It includes waging wars to get it, protect it, and defend the maritime trade routes over which it travels. That means energy's partnered with predatory New World Order globalization, militarism, wars, ecological recklessness, and now an extremist US administration willing to risk Armageddon for world dominance. Central to its plan is first controlling essential resources everywhere, at any cost, starting with oil and where most of it is located in the Middle East and Central Asia. The New "Great Game" and Perils From It The new "Great Game's" begun, but this time the stakes are greater than ever as explained above. The old one lasted nearly 100 years pitting the British empire against Tsarist Russia when the issue wasn't oil. This time, it's the US with help from Israel, Britain, the West, and satellite states like Japan, South Korea and Taiwan challenging Russia and China with today's weapons and technology on both sides making earlier ones look like toys. At stake is more than oil. It's planet earth with survival of all life on it issue number one twice over. Resources and wars for them means militarism is increasing, peace declining, and the planet's ability to sustain life front and center, if anyone's paying attention. They'd better be because beyond the point of no return, there's no second chance the way Einstein explained after the atom was split. His famous quote on future wars was : "I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones." Under a worst case scenario, it's more dire than that. There may be nothing left but resilient beetles and bacteria in the wake of a nuclear holocaust meaning even a new stone age is way in the future, if at all. The threat is real and once nearly happened during the Cuban Missile Crisis in October, 1962. We later learned a miracle saved us at the 40th anniversary October, 2002 summit meeting in Havana attended by the US and Russia along with host country Cuba. For the first time, we were told how close we came to nuclear Armageddon. Devastation was avoided only because Soviet submarine captain Vasily Arkhipov countermanded his order to fire nuclear-tipped torpedos when Russian submarines were attacked by US destroyers near Kennedy's "quarantine" line. Had he done it, only our imagination can speculate what might have followed and whether planet earth, or at least a big part of it, would have survived.

#### Economic collapse results in extinction.

Lachman and Auslin 9 [Desmond: fellow at AEI, Michael: scholar at AEI “The Global Economy Unravels” March 6, 2009 American Enterprise Institute http://www.aei.org/article/economics/international-economy/the-global-economy-unravels/]

What do these trends mean in the short and medium term? The Great Depression showed how social and global chaos followed hard on economic collapse. The mere fact that parliaments across the globe, from America to Japan, are unable to make responsible, economically sound recovery plans suggests that they do not know what to do and are simply hoping for the least disruption. Equally worrisome is the adoption of more statist economic programs around the globe, and the concurrent decline of trust in free-market systems. The threat of instability is a pressing concern. China, until last year the world's fastest growing economy, just reported that 20 million migrant laborers lost their jobs. Even in the flush times of recent years, China faced upward of 70,000 labor uprisings a year. A sustained downturn poses grave and possibly immediate threats to Chinese internal stability. The regime in Beijing may be faced with a choice of repressing its own people or diverting their energies outward, leading to conflict with China's neighbors. Russia, an oil state completely dependent on energy sales, has had to put down riots in its Far East as well as in downtown Moscow. Vladimir Putin's rule has been predicated on squeezing civil liberties while providing economic largesse. If that devil's bargain falls apart, then wide-scale repression inside Russia, along with a continuing threatening posture toward Russia's neighbors, is likely. Even apparently stable societies face increasing risk and the threat of internal or possibly external conflict. As Japan's exports have plummeted by nearly 50%, one-third of the country's prefectures have passed emergency economic stabilization plans. Hundreds of thousands of temporary employees hired during the first part of this decade are being laid off. Spain's unemployment rate is expected to climb to nearly 20% by the end of 2010; Spanish unions are already protesting the lack of jobs, and the specter of violence, as occurred in the 1980s, is haunting the country. Meanwhile, in Greece, workers have already taken to the streets. Europe as a whole will face dangerously increasing tensions between native citizens and immigrants, largely from poorer Muslim nations, who have increased the labor pool in the past several decades. Spain has absorbed five million immigrants since 1999, while nearly 9% of Germany's residents have foreign citizenship, including almost 2 million Turks. The xenophobic labor strikes in the U.K. do not bode well for the rest of Europe. A prolonged global downturn, let alone a collapse, would dramatically raise tensions inside these countries. Couple that with possible protectionist legislation in the United States, unresolved ethnic and territorial disputes in all regions of the globe and a loss of confidence that world leaders actually know what they are doing. The result may be a series of small explosions that coalesce into a big bang.’’

### Plan Text

#### Thus the plan: The United States Federal Government should provide a twenty-percent investment tax credit for the deployment of domestic nuclear fuel recycling.

### Solvency

#### Observation Four: Solvency

#### Tax incentives would solve for reprocessing – makes it commercially more desirable

Lagus 5 (Todd, 2005 WISE Intern, University of Minnesota, WISE, “Reprocessing of Spent Nuclear Fuel: A Policy Analysis” <http://www.wise-intern.org/journal/2005/lagus.pdf>, RSR)

The economic analysis shows that the reprocessing or even the once through nuclear cycle is not yet economically desirable to investors. However, changes in government policies, including environmental regulations already mentioned and economic policies, could improve the competitiveness of both technologies. The University of Chicago nuclear power study analyzes the effects of government involvement in the future of the once through cycle using several different forms of support: loan guarantees, accelerated depreciation, and investment tax credits. Loan guarantees in this case refer to the obligation of the government to repay part of the loan should a utility company not be able to repay. The 2005 Energy Bill, which passed in July 2005, would make advanced nuclear power plants eligible for federal loan guarantees and provide a tax credit for nuclear power production. This would lessen the risks associated with capital costs for investors, and according to the Chicago study, reduce the LCOE for a nuclear reactor by 4 mills/kWh to 6 mills/kWh. The next financial subject, accelerated depreciation, refers to the ability of an investor to utilize the investment tax deductions early on in the lifetime of the payment rather than receive the same deduction each year in a linear fashion. Accelerated depreciation helps investors absorb capital costs, which for nuclear power generation are large. The University of Chicago study calculates a reduction in the LCOE for a 7 year depreciation policy of 3 mills/kWh to 4 mills/kWh. Tax incentives for nuclear power production are the final policies that could make nuclear power and reprocessing more desirable. An investment tax credit of 10 percent would create an LCOE reduction between 6 mills/kWh and 8 mills/kWh, while a 20 percent credit could create cost reductions between 9 mills/kWh and 13 mills/kWh. 39 Production tax credits on a per kWh basis may also be used. Since reprocessing and the once through cycle are not appreciably different for the price, it is sufficient to assume 12 that similar effects for all three of these government policies would occur with policies applied to reprocessing. While it is no secret that monetary incentives would help the nuclear reprocessing investments, there is still the question of whether or not the government should provide economic support to the industry. As with any government funding, it is politically important not to be viewed by other energy generation industries, i.e. gas and coal, as favoring nuclear power over other sources. Given the recent concerns for global warming, tax incentives and loan guarantees for nuclear technologies seem like a realistic option especially in the absence of emission regulations. Accelerated depreciation also is an unobtrusive option that could help the industry by easing capital costs.

#### Government investment key – necessary to mitigate risks from government regulations.

Selyukh 10 (Alina, Staff Writer, “Nuclear waste issue could be solved, if...”, 8-17-10, Reuters,

<http://www.reuters.com/article/2010/08/17/us-nuclear-waste-recycling-idUSTRE67G0NM20100817>, RSR)

Since the U.S. agency declared spent fuel reprocessing too costly, U.S. research into new technologies has slowed. President George W. Bush offered federal backing for nuclear waste management alternatives, but over the years the policy has meandered and had few incentives to lure companies, said Steven Kraft, senior director of used-fuel management at the Nuclear Energy Institute, the industry's trade organization. Being able to burn through rather inexpensive uranium to produce energy, companies are wary of investing millions into recycling technology that may go against the national policy. Still, industry support for the ideas is strong, if not for the procedure itself then for allowing the market -- not the government -- to determine its cost-effectiveness and fate. Duke Energy, which operates seven nuclear plants, would support nuclear recycling if there was a cost-effective national policy, spokeswoman Rita Sipe said. GE Hitachi has proposed a new generation of fast reactors that, they say, could return to the grid up to 99 percent of energy contained in the uranium, compared to recovering 2 or 3 percent from a common light water reactor. But they want federal support for more research and, ultimately, commercialization of the technology, said chief consulting engineer Erik Loewen. That support, in essence, would have to come in a form of subsidies such as cost sharing or loan guarantees, said Jack Spencer, nuclear energy policy research fellow at the Heritage Foundation think tank. "What the industry needs... is something to mitigate government-imposed risks," he said of the regulatory regime.

#### Government investment necessary – provides appropriate risk mitigation and shortens the timeframe for completion.

IAEA 8 (International Atomic Energy Agency, “Spent Fuel Reprocessing Options”, August 2008, RSR)

With the expected high costs and significant risks involved in constructing new nuclear facilities, e.g., reprocessing facilities, the impact of various ownership options need to be considered. These options include government funding, regulated funding, private funding, and combinations of public and private funding. These different funding approaches may significantly impact the costs of fuel cycle services. Given the very long time frames associated with building reprocessing facilities, there exist risks other than technological or economic, which need to be dealt with. These include evolving government policy, public and political acceptance, and licensing risks. As a result, private investors are unlikely to provide capital unless the initial high risks factors are mitigated through appropriate risk sharing agreements (e.g., loan guarantees, equity protection plans, tax credits, etc.) with government entities.