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From: Rick Morgal [mailto:rmorgal@wildblue.net]
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Cc: Bonnie Morgal
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Please accept my attached comments to the NRC's Waste Confidence Environmental Impact Statement.

Respectfully submitted on December 20th 2013.

Rick Morgal

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In the past fifty years, the nuclear industry has not determined how to address the issue of storing spent nuclear fuel generated by commercial nuclear power plants. Now the public is being asked to comment on the NRC's Draft Waste Confidence Generic Environmental Impact Statement. As an engineer and concerned citizen, it is my duty to state that I have little, to no, confidence in the NRC's Waste Confidence Generic Environmental Impact Statement based upon a myriad of issues and the manner in which these issues have been historically addressed by the NRC.

To summarize my comments it is obvious that the NRC minimizes the calculated risk and incurred cost of nuclear power, exposing an unknowing public to risks far greater than revealed by NRC reports and documents. The NRC's Waste Confidence Generic Environmental Impact Statement is another evolutionary step in the process of upping the public's exposure to a potential catastrophic nuclear accident. This is all being done while the NRC does as little as possible to draw attention to itself or the nasty truth that nobody in the entire world has proven how to safely store spent nuclear fuel for the eons of time required to protect the biosphere from high concentrations of its radio nucleotides. Countries like Germany are shutting down their power plants due to the problems associated with accidents and spent fuel storage. It's not a question of IF, it's a question of WHEN we too realize the risks, costs and toxicity of spent nuclear fuel it too high when compared to alternatives. The NRC's Waste Confidence Generic Environmental Impact Statement delivers additional costs associated with short-term to mid-term (60 to 200 years) on-site storage of spent nuclear fuel and add yet another layer of real expense to the overly subsidized "too cheap to meter" vision of nuclear power.

Evolution of Waste Handling and its Current Impact on Local Communities

The operation of the nation's nuclear power plants has evolved over the last fifty years. Initially, a reactor's spent fuel pool was designed and built to hold a single core's worth of spent nuclear fuel with the stated operational procedure involving the removal of the spent fuel core before the next core was depleted. Historically this rarely, if ever, happened due to the US nuclear industry's inability to determine how to manage spent fuel.

Now these same spent fuel pools, built years ago, have new racks allowing them to hold six to eight times as much nuclear waste as initially designed to hold. A typical spent fuel pool in the US holds more than one million of pounds of spent fuel. These pools must actively water-cool their contents to prevent the nuclear fuel from spontaneously combusting when in prolonged contact with air.

The above-described incremental changes in the nation's nuclear spent fuel management policies negatively impact communities near nuclear power plants by significantly increasing the quantities of spent nuclear fuel stored at each nuclear power plant site. In a post Fukushima era, the "local community" is now considered to be a 50 mile radius which places over EIGHT MILLION PEOPLE within San Onofre's "local community".

Erroneous Use of Probability-Weighted Consequence to Estimate the Number of Fatalities Associated with a Spent Fuel Pool Fire

Section F.2.2 of the Draft NUREG-2157 describes using a Probability-Weighted Consequence to estimate the number of fatalities associated with a spent fuel pool fire. This mathematical approach to quantifying risk basically counterbalances a catastrophic event with a small probability that the event would occur. By using this type of analysis the NRC creates an illusion that few fatalities will ever transpire due to the perceived unlikelihood of a spent fuel pool fire occurring.

The error in using the Probability-Weighted Consequence approach to predict fatalities associated with a Spent Fuel Fire is based upon attempting to estimate the probability of a successful terrorist attack on a spent fuel pool. In that light, Paragraph 4.19.1 of Draft NUREG-2157 states:

"The NRC has determined that the probability of a successful terrorist attack on a spent fuel pool, although numerically indeterminable, is very low."

The Draft NUREG-2157 Section F.2.2 then goes on to justify how the NRC determines the probability of a spent fuel fire is low based upon structural features of spent fuel pools, security measures and emergency procedures in place at the plant that would thwart a terrorist attack.

The Draft NUREG-2157 Section F.2.2 then equates the probability weighted consequences of a spent fuel pool to the probability weighted consequences of a severe nuclear reactor accident. Thus, a numeric probability is indirectly placed onto a numerically indeterminable probability. I would argue that the probability of a successful terrorist attack on a nuclear reactor is also numerically indeterminable. Yet with a broad-brush statement that a severe nuclear reactor accident and a spent fuel pool accident have equal probability weighted consequences, the error associated with applying a probability weighted consequence to a successful terrorist attack on a nuclear reactor is now being applied to determine the weighted consequence of a successful terrorist attack on spent fuel pool. The probability of a successful terrorist attack on a spent fuel pool is numerically indeterminable and probability weighted consequences should not be applied to spent fuel pool fires or sever nuclear reactor accident.

Nuclear Power Plant Spent Fuel Pools are Known to be Unable to Survive Impacts From Aircraft Attacks

It is telling that in several documents, including 10 C.F.R. § 73.1., the NRC and the nuclear power plant operator, by charter, are NOT responsible to defend our nuclear power plant spent fuel pools from large aircraft attacks. Thus, it is known that the spent fuel pools are unprotected from an aircraft attack similar to what occurred to the World Trade Center on September 11th 2001. Yet the risk "is very low" in the minds of the owners of the plants and their regulators. When hearing this I feel as thought he NRC is in the same state of mind that the FAA was in just before September 2001 or the SEC

was in before the financial crisis of 2007. Even if the TSA has been successful in preventing another event similar to the September 11th 2001 event, technology is continually making their job harder. The NRC's Draft Waste Confidence Generic Environmental Impact Statement is proposing spent nuclear waste storage system that will remain in place for 60+ years. Just in the last two years 3-D printing technology has become mainstream and now people can print a plastic gun able to pass undetected through the TSA X-ray screening systems. Now domestic US commercial aircraft have raised the risk of being hi-jacked for terrorist purposes. Its difficult to project what technology will enable people to easily do 60 years from now but it is quite possible the risk of an large aircraft being acquired for terrorist purposes will increase over time and possibly quite significantly.

A known weakness in our nation's nuclear reactor's spent fuel pools has been categorically ignored by the NRC and plant operators due to the economic costs associated with adding infrastructure that could make the success of a terrorist attack with a commercial aircraft less likely. The fact that spent fuel pools in all new nuclear power plant designs are required to be able to survive an impact from large commercial aircraft is an indication that the NRC knows our nation's legacy spent fuel pools are vulnerable to aircraft attack, yet there is no incentive to fortify our infrastructure because of economic reasons. Eight million people being affected and half of California's economy should be worth protecting from the likes of what happened on September 11, 2001. But adding the cost of protecting all the spent fuel pools in the US to the cost of nuclear power would impact the cost per kilowatt of nuclear generated electrical power. No spent fuel pools should be used to store a decommissioned plant's spent fuel rods once the fuel rods are cool enough to be transferred to a dry cask.

This situation brings to mind the popular quote:
"Never underestimate the power of a few committed people to change the world. Indeed it is the only thing that ever has."

We all understand the above quote but in the context of an event probability being determined as "numerically indeterminate" the NRC needs to realize that it would take a relatively small group of committed people to charter a Mexican cargo plane filled with fuel and heavy machinery to fly less than 20 minutes in US airspace before crashing down into one of the San Onofre spent fuel pools. The down wind impacts of such an event would be devastating to our nation, the nuclear industry and the world. It is paramount that the NRC keep in mind that TSA improvements in commercial aircraft security due to the September 11, 2001 tragedy are not effective in stopping international plane attacks.

Dirty bombs are hard to manufacture due to the difficulty in obtaining the nuclear material. But a well placed surplus cargo plane on a San Onofre Nuclear Generating Station's spent fuel pool would be the largest dirty bomb possible with the perpetrators having no need to obtain, prepare or handle any nuclear material. This very real terrorist threat should not be allowed to exist longer that is required for the fuel within the spent fuel pool to cool sufficiently to be placed in dry casks.

Possibility of Nuclear Power Plant Owner Choosing to Use Spent Fuel Pools as Holding Pools Until a Centralized Long Term High Level Waste Repository Becomes Available

The once a nuclear power plant is shut down the NRC does not dictate how the power plant owner/operator should go about decommissioning their facility. Details about how the plant will be dismantled and the schedule is left up to the plant owner/operator. With the lack of a national repository for high-level waste the plant owner/operator must, under NUREG 2157, store the spent nuclear fuel on site. I am concerned that once a nuclear power plant is shut down, the plant owner/operator may decide that it is too expensive to build dry casks and keep spent fuel in the shut down plant's spent fuel pool until a national repository for high level waste is built.

This scenario is not addressed in the NUREG 2157 and would further expose the surrounding community to prolonged periods of time where large quantities of spent nuclear fuel is in one place, relying upon active cooling, and more vulnerable to a potential terrorist aircraft attack when compared to dry casks. Allowing the plant owner/operator to make the determination of whether or not to place the spent fuel in dry casks or leave it in the spent fuel pool based upon cost/profit considerations is not fair to the surrounding community.

This is especially true when Section F.2.2 entitled probability-weighted consequences of a Spent Fuel Pool Fire is considered where the NRC states that the probability-weighted consequence of a severe nuclear reactor accident is equated to the probability-weighted consequence of a spent fuel pool accident. Under NUREG 2157 the surrounding community could have to live with the possibility of an accident equal in consequence to a severe nuclear reactor accident for up to 60 years after the plant is shut down. While the plant owner/operator decommissions the plant with the spent fuel in the pools rather than in dry casks.

Additionally there is increased likelihood of an unintentional loss of cooling power to the spent fuel pool during the decommissioning process that could result in a spent fuel pool fire. It is suggested that that NRC motivate the shut down plant's owner/operator to quickly move the spent fuel into dry casks by tying the availability of decommissioning funds to the act of placing all the spent fuel into dry casks as soon as it is thermodynamically possible. This simple approach would not require the owner/operator to place the spent fuel into dry casks but with the uncertainty of sufficient decommissioning funds the owner/operator would be motivated to move the spent fuel quickly into casks to receive decommissioning funds more swiftly. Making sure the plant owner sees access to decommissioning funds tied to the movement of spent fuel from pools into casks will expedite the closure of the spent fuel pools. It is understood that the last spent fuel rods may take up to ten years to sufficiently cool before they can be installed into dry casks but given the 60 year timeline to decommission a plant ten years would not be that long of a wait before the plant begins to be dismantled using decommissioning funds.

The surrounding community should not be forced to live with another 50 years of spent nuclear fuel residing in pools because the owner/operator sees a centralized high level waste facility being built 50 years from now averting the costs associated with building dry cask storage systems. The suggestion is to make the owner/operator transfer all the spent fuel on site into dry casks before the owner/operator gains access to decommissioning funds will reduce the surrounding community's exposure to a potential catastrophic nuclear accident.

Its bad enough to have to impact the surrounding community with on-site dry cask storage for up to 200+ years but to allow the plant owner to keep spent fuel pools operational for half a century in a speculative venture is not fair to the surrounding community and has national security risks. The NRC must not allow the spent fuel pools to become part of the owner/operator's short-term (60 year) spent fuel storage strategy. This situation is especially true in light of the severe consequences of a successful terrorist aircraft attack on a spent fuel pool and the numerically indeterminable probability of such an event occurring.

National security issues are based upon the fact that dry cask storage systems take time to fabricate and after a first successful terrorist aircraft attack on a spent fuel pool it will take years to build and transfer all the fuel stored in spent fuel pools into dry casks. During those years of cask building, our country will be placed on red alert for potential terrorist aircraft attacks on the remaining spent fuel pools on the nations reactor sites.

This recommendation is not directed towards the process of decommissioning. The recommendation is directly related to the general confidence of the surrounding community towards onsite storage of spent nuclear fuel addressed in NUREG-2157. Although the NRC believes both the spent fuel pools and dry cask storage are equally safe means of storing spent nuclear fuel, Fukushima has shown that spent fuel pools are nowhere near as robust in surviving an earthquake-tsunami event when compared to dry cask storage. Additionally it is hard to imagine a single terror event inflicted upon a dry cask storage system that would equal the radiological fallout from a single successful terrorist aircraft attack on a full spent fuel pool where a zirconium cladding fire occurred. Removing the active cooling requirements and lowering the concentration of the spent fuel storage density as quickly as possible will enhance the surrounding community's confidence in short-term nuclear waste storage.

<u>Elimination of Offsite Emergency Planning During Times When A Catastrophic Nuclear Accident is Still Possible</u>

Referring to the NRC's website entitled "Spent Fuel Storage in Pools and Dry Casks Key Points and Questions & Answers" located at http://www.nrc.gov/waste/spent-fuel-storage/faqs.html#26, the last question regarding emergency planning of plants undergoing the decommissioning process states that:

"Offsite emergency planning may be eliminated when the fuel has been removed from the reactor and placed in the spent fuel pool, and sufficient time has elapsed, such that there are no longer any *postulated accidents* that would result in offsite dose consequences large enough to require offsite emergency planning."

Regarding the above NRC statement, the NRC needs to include the *postulated accident* of a successful terrorist aircraft attack on the spent fuel pool and its contents being exposed to air due to sufficient aircraft impact and the resulting explosive fireball being forceful enough to excavate sufficient cooling water out of the spent fuel pool to initiate a zirconium cladding fire of the pools contents. With this scenario in mind, the radioactive contents of the spent fuel pool do not significantly reduce over time to a level where offsite dose consequences would be so small that offsite emergency planning could be eliminated.

Given the equality of a spent fuel pool fire to a severe nuclear reactor fire (as stated above and in NUREG-2157 section F.2.2) and the numerically indeterminable probability of a successful terrorist attack on a spent fuel pool (stated in Paragraph 4.19.1 of Draft NUREG-2157), it would seem unlikely that there would ever be a time that offsite emergency planning could be eliminated until the spent fuel pools were entirely emptied. There can be no sense of confidence in the NRC's waste storage plan when offsite emergency planning is eliminated before all the spent fuel is removed from the spent fuel pools. The NRC needs to level with the public and state that there are several postulated accidents that make dry cask storage systems more robust and safer than spent fuel pools.

Tsunami, earthquake and a successful terrorist aircraft attack are three examples of such postulated accidents that could result in a spent fuel pool fire.

Once the NRC accepts the above statement and steps are taken to expedite the transfer of all the spent fuel from pools to casks before elimination of offsite emergency planning the beginning of a sense of confidence regarding spent fuel could emerge.

<u>Facilitating Confidence of Nuclear Waste Storage With in the Surrounding Community</u>

Confidence is fostered through knowledge and preparation. To date the NRC has been less than forth coming to the public about known possible consequences associated with a spent fuel fire and its potential impacts on the surrounding community. A prime example of the NRC knowingly covering up the potentially catastrophic outcome of a spent fuel pool fire is found in Draft NUREG-2157's Table F-1 where it is estimated that there would be 191 Collective Early Fatalities from a spent fuel fire. My sense of confidence in the NRC's risk evaluation process is lost with such unreasonably low predictions.

This low prediction of fatalities does not compare with the huge quantities of stored spent fuel in each pool at San Onofre. According to a report authored by Robert Alverez entitled "Reducing the hazards of high-level radioactive waste in Southern California" published by Friends of the Earth, if only 30% of one of the San Onofre spent fuel pools was released by a fuel pool fire, the resulting fall out dead zone could be more than 10

times the size of the Chernobyl accident resulting in a dead zone five times the size of the state of New Jersey, where people would never return to Southern California. In light of Mr. Alverez's estimations of the impact of a spent fuel fire of one of the San Onofre spent fuel pools, the 55 Billion dollar economic impact stated in Draft NUREG-2157's Table F-1 would not even come close to the real estate losses of a successful terrorist aircraft attack on a San Onofre spent fuel pool. Yet alone the personal loss of time, economic loss of industrial production or the impact on the world economy. The NRC needs to be more realistic in their fatality predictions as a service to the public and to begin to acknowledge the severe impact one fully fueled jet aircraft could have on our nation.

Once a more realistic prediction of potential impacts of a spent fuel pool fire is presented it is equally necessary to ensure that until all the spent fuel is placed in dry cask storage there needs to be an education program to alert the entire US population to the health impacts associated with a spent fuel pool fire. The entire US population should then be educated on steps that should be taken in case of a spent fuel pool fire emergency before a spent fuel pool fire is experienced by the general public on TV.

The NRC and the federal government should take pro-active steps to ensure immediate availability of potassium iodide tablets to all inhabitants within a 50-mile radius of each nuclear power plant and/or operational spent fuel pool. Current availability of potassium iodide tablets at local drug stores is non-existent. This fact needlessly exposes the surrounding community to significantly increased chances of thyroid cancer a few years after a successful spent fuel fire has occurred. Mainly through radical survivalist Internet-mail-order stores can potassium iodide tables be purchased, making it virtually impossible for an ignorant general public to attain protection from radioactive iodide becoming concentrated in person's thyroids within the fallout region of a spent fuel pool fire. These tablets need to be available immediately following a spent fuel pool fire to all people within a 50-mile radius of the spent fuel pool. Stockpiles in a few strategic locations across the nation will not provide sufficiently rapid access to protect to the public. It is suggested that a local convenience store like 7-11 be the local repositories of potassium iodide tablets within the 50 mile radius of each of the nation's spent fuel pools with the public being told where to go to obtain the tablets. Additionally these tablets should be distributed to residents within the 50 mile radius of the spent fuel pool. Since Potassium Iodide tablets last 10 plus years this level of protection to the general public would not be that costly compared to the increased number of thyroid cancers that would result from allowing the general public to go unprotected. In the past the NRC has justified not providing these tablets except to residents in a very small radius around a nuclear power plant based upon cost. Fukushima should be a wake up call to the possibilities of a spent fuel pool fire. Due to prevailing winds, had Fukushima been on the West Coast of Japan the human and economic impacts would have been magnitudes greater.

Until the NRC incorporates a proactive education program that informs the public of potential impacts to the surrounding community and its inhabitants from a spent fuel pool fire it will be hard to have any sense of confidence in the NRC's approach to the storage

of spent nuclear fuel. Additionally this education program must also be coupled with publically known repositories of potassium iodide tablets to provide the surrounding public a sense that the NRC is prepared to protect the public's safety from the dangers of nuclear materials. Seeing that "protection" is the NRC's number one *stated* priority, until that directive is filled with respect to a spent fuel pool fire, there can not be any sense of confidence in any other aspect of how nuclear waste material is stored for tens if not hundreds of years on the past sites of nuclear power plants.

Harden Dry Cask Storage Systems To Survive Impacts From Large Aircraft

The NRC needs to stop allowing the nuclear power plant owners from utilizing dry cask systems that are not capable of protecting their contained fuel from an impact from a large aircraft. The Draft GEIS talks about storing fuel in casks for up to several hundred years. The casks used need to be able to endure whatever mechanical impacts we can foresee in our current society before we pass the site on to the next seven generations. Massive movable concrete ramps positioned in front of the cask lid could be used to deflect an aircraft from directly hitting the metal cover of the NUHOMS dry casks. The ramps could be segmented, allowing them to be moved to facilitate inspection and re-arrangement dry cask contents. Since the concrete pad is very thick where the dry cask transportation truck operates, the weight of the concrete ramps would not be a problem to the storage site. By orienting the ramps in front of the NUHOMS metal cover it would be possible to protect the dry cask sealed lid from direct impact from a large aircraft. Protecting the surrounding community from a possible dry cask dirty bomb fallout scenario less catastrophic than a spent fuel pool fire but still potentially very devastating to the surrounding community.

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