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From: Peter Vogt [vogtpr@comcast.net]
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To: CalvertCliffsCOLAEIS Resource; CalvertCliffsCOLAEIS Resource
Subject: Statement RE Unistar reactor proposed for Calvert Cliffs
Attachments: nuclear letter to EIS.doc

Sirs/NRC: Please find attached comments RE the EIS for a proposed additional UNISTAR reactor at Calvert Cliffs. I was unable to attend the 19 Mar 08 meeting in Solomons.
Peter Vogt (Dr.)

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ATTENTION: EIS for proposed Unistar reactor, Calvert Cliffs

Dear Sirs/Madams:

Following is my list of real and/or potential impacts—requiring quantitative evaluation and analysis-- from the proposed Unistar 1600 MW reactor at Calvert Cliffs Nuclear Power Plant, operated by Constellation Energy Inc. For the record, I am a 39- year resident of Calvert County. With a BS *cum laude* from Caltech and a PhD from the University of Wisconsin, I served as marine geophysicist with the US Naval Oceanographic Office (1969-1975) and the Naval Research Laboratory (1976-2004). I am currently a Professional Researcher at UC Santa Barbara, a Research Associate at the Smithsonian Institution, and Adjunct Professor at the Horn Point Laboratory, Cambridge, MD. My comments on the proposed reactor are my own, and I do not speak for any of the above institutions.

Let me also make it clear that I have high respect for the USN submarine community, with which I had various professional contacts during my long career in ocean- floor research. In 1999, as part of this work, I spent 7 days onboard the nuclear research submarine NR-1, now the Navy's oldest sub still in operation. Nothing in the following should be construed as reflecting unfavorably on any members of the submarine community, nor on those, trained on US submarines, who later pursued civilian careers working for or associated with nuclear power plants. Many of these latter civilians are among my neighbors—they all moved into our community when the two existing Calvert Cliffs reactors were built.

My comments are grouped into six parts, which I have called 1) Safety; 2) Jobs and Traffic; 3) Local Environmental Impact; 4) Transmission Corridor; 5) Demand Projections; and 6) Alternative Clean Energy Sources.

1)Safety: I consider the likelihood of a major accident extremely small: I spent a week within less than 100 ft of a reactor on NR-1 and was never concerned about safety. However, we are getting a mixed message: If nuclear power plants are so safe, why was it necessary to renew the Price-Anderson Act yet again? When first passed (1957) it made sense, but was meant for just a decade. When a clearly mature industry—now more than a half century old—still requires the Federal Government to underwrite insurance, something is clearly wrong.

With many others, I believe the risk factor is largely related to potential terrorist attacks. If you look at manmade or man-nature megacatastrophes of the recent past, you will surely find that one week prior to their occurrence, most would have scoffed at such an event being any more than remotely possible (Katrina, Three-Mile Island, 9-11, Mt. St Helens, 2004 Indian Ocean tsunami, even Chernobyl). The lesson

to be learned is that risks of rare but catastrophic events are usually under-estimated, due to data paucity, i.e. rarity. In the case of even the EXISTING two reactors at Calvert Cliffs, the visitor center was closed only **AFTER** 9/11. Yet the RISK did not increase as a result of 9/11: It was the nuclear industry's ESTIMATION of the risk which had increased. This distinction is important but rarely understood.

Calvert Cliffs is already a high-profile potential target, located less than 50 miles from the White House. The proposed 1600 MW reactor would also be the largest in the US, and together with the other two would create one of our very largest US nuclear power plants. Add to that its proximity (4 miles!) to the recently enlarged Dominion Liquified Natural Gas (LNG) terminal storage facility and its proximity (9 miles) to the large—and further enlarged in recent years, as a result of BRAC-- Patuxent River Naval Air Station, and **you would probably have one of the, if not the, most attractive terrorist targets in the US**. **The largest US reactor, also closest to the US capitol**! In my opinion it is very unwise to create such an inviting target, no matter how well fortified by security measures.

Your risk assessment must consider rapid population growth in the Calvert Cliffs Nuclear Power plant region. **Calvert County itself has grown from ca. 20,000 when the first two units went online, to nearly 90,000 today.** The Lexington Park area across the Patuxent has also exploded in population, especially after BRAC relocated facilities there from elsewhere. This has multiplied by more than 4, I would guess, the number of people living within a given radius of the plant, beyond its forest buffer zone. Two of the most populated communities in Calvert County (White Sands/Lusby) and Chesapeake Ranch Estates are located just a few miles from the Calvert Cliffs Nuclear Power Plant. These communities were already present when Units I and 2 were built, but general population growth and an abrupt loosening of County building restrictions has caused disproportionate population growth in both areas. The Chesapeake Ranch Estates, a warren of numerous narrow roads and thus difficult to evacuate, is located between 5 and 7 miles from the power plant, and its population has grown from a few thousand to ca. 12,000, with ca. 4000 houses and growing (6045 lots originally platted, not all buildable by current laws—which could change, particularly if public sewerage is offered). The White Sands community ranges from 1/1/2 to 2 ½ miles from the reactors, and has 1159 platted lots, of which 710 were 'improved' with housing as of 2005. Much new commercial/retail development has occurred in the last two years in Lusby, located just 2 ½ miles south of the reactors.

I know the EIS office will calculate the risks from numerous potential combinations of human errors and component failures, and thereby demonstrate great safety. You will probably also conclude that most potential attacks would be readily thwarted—with the possible exception of a large passenger or freight jetliner flown into a reactor. However, you owe it to the public to say how much this security costs, compared to the security required for a fossil fuel plant of the same MW. What I urge you **to calculate is the societal and $$ impact from a FAILED attack**, which is of course far more probable than a successful one. Public and investor confidence are highly volatile, and the economic and sociopolitical impact of a foiled terrorist attack on Calvert Cliffs could be enormous. What is the dollar worth of a 10% decline in Calvert real estate as a result of such a failed/foiled attack? **The public is easily panicked by even small releases of radioactivity, which could happen from an attack on a waste storage facility, or even an**

introduced radioactive source falsely claimed to have been stolen from the power plant. You can draw from the example of the anthrax scare, which killed only a handful of people, but imposed great societal costs. **We are dealing with ingenious enemies, willing to sacrifice their lives**. This is quite different from the mid-70s, when Calvert Cliffs Unit I and Unit 2 went into operation: At that time the threat was from nuclear war with the USSR, which was at least ruled by rational and cautious, not suicidal people.

2) **Jobs and Traffic**: Constellation states that the **proposed third reactor would provide several thousand construction jobs and several hundred permanent jobs.** Many of these new jobs, as well as visitors, and delivery trucks, **will add substantial traffic to MD 2/4, which at present is a congested and dangerous highway** (the part north of about Broomes Island Road is not even remotely limited-access). **High speeds, traffic lights, and unmarked private entrances are a dangerous mix.** The EIS must include estimates for added traffic, while **factoring in the following: 1) Few counties in the US are as dependent on a single arterial as Calvert County is on MD 2/4.** This circumstance also affects the problem the operator and local authorizes would **face trying to evacuate large numbers of people**; Calvert County has the highest mean daily commuting distance and time in Maryland, so any added traffic would have a greater impact on Calvert than on most other counties. 2) **Traffic on this highway has been increasing even faster than the population—and Calvert has been at or near the top of population growth rates among Maryland counties for decades**: Your estimate needs to consider the **trend** when you estimate traffic impact when reactor construction might begin; 3) **MD 2/4 is currently near failure** (categories D or worse), especially during rush hour. The counter near Prince Frederick has reached 40,000 vehicles per day, and much of the new reactor traffic would have to pass through Prince Frederick. Your assessment needs to acknowledge the 'stutter-step' response of infrastructure (e.g., roads, schools, airports, etc.) to growth: When the first units went online, the highway had already been dualized down to about Huntingtown, but carried only around 7,000 vehicles per day +/-. Since the highway was far under capacity, adding power plant traffic was not a major problem. **However, adding more traffic to a barely functioning highway might require a third lane, overpasses, more lights, etc. Who will pay** (not the NRC or Unistar, I wager), **and when would these be built**? EIS statisticians should be able to estimate, with some range of caveats/assumptions, the **probable mean traffic delay imposed by reactor construction and operation**, and **what a mean 1 minute daily traffic delay would cost annually**, as well as the likely number of additional accidents per year. Even neglecting the delays and cost due to increased accidents, I roughly estimate the total annual cost for every 1 min traffic delay at from $5 million to $50 million. It is unacceptable that this cost is ignored just because it is (like investor risk) dispersed among many thousands of people.

Those filling the new jobs will either be A) new to the county or B) county residents who are unemployed or underemployed, or give up their existing job to work at Calvert Cliffs. Type A) employees will either 1- commute to the plant from outside the county, or 2-move here with their families. All A) type employees will add to the traffic load, particularly A2 types, usually fairly young married men with a Navy background. These men and their families will add the most traffic. They will also likely add the largest number of new school children to a school system struggling to keep up. **Current k-12 educations cost about $2.5 million per 20 children** -over half of this is paid by the County. **The EIS**

needs to estimate the likely number of new children added to the school system as a result of a new reactor- and take into consideration that the new employees will likely be in their prime child-producing years. Calvert County wants its school children to get the best education possible, within the limits of County resources: That's precisely why the County is favoring construction of adult housing—so that more funds will be available per school child.

The Board of Commissioners of Calvert County and its Economic Development Commission appears to think that many of the higher paying very specialized technical and related management jobs would go to existing county residents. They are wrong. I submit this is a unlikely today as it was in the 70s—practically all my "nuclear" neighbors moved here from outside. Even with a PhD in a hard science, I would not qualify for those nuclear jobs, and neither would almost anyone else. The EIS process should include impartial estimates showing a breakdown of job and pay categories, in terms of the % likely filled by county residents.

3) **Local Environmental Impact from proposed reactor.** According to Constellation sources, ca. **300 acres will have to be cleared of forest for new reactor construction**. **This forest forms part of the two remaining Calvert County areas of relatively contiguous forest, which represent "bioreserves" , for example for successful reproduction of numerous neotropical migrant bird species, whose populations have been steadily declining (at rates from ca. 1 to several % per year, depending on species)** throughout the eastern US for some decades. One of the two areas extends from Flag Ponds Nature Park across through the Constellation forest buffer zone, and down into the Calvert Cliffs State Park and the buffer zone around the Dominion LNG terminal area. The Calvert Cliffs forest buffer zone, managed for wildlife under the WHIP program by the operator, is actually better for Forest Interior Dwelling species (FIDs) than parks opened to the public, which are more prone to disturbance. **300 contiguous acres of forest lost to the new reactor would probably comprise the biggest single loss of contiguous forest (the ecologically valuable type) in Calvert County for decades, if not ever. The EIS needs to estimate the resulting loss of nesting sites etc. from the clearing of this 300 forested acres.**

4) **Transmission Corridors.** Construction of Units 1 and 2 in the 1970s carried with it the need to clear, build, and maintain (forever shorn of tree cover) a long transmission corridor. During the original application process, the operator failed to note the apparent need to build a connecting 500kV line from Calvert Cliffs to Chalk Point—in fact the power plant was operated for more than 10 years without such a connector. Adding this connector to the original corridor, I estimate the total **length of 500 kV lines in Calvert County alone at 60 miles, with over 1200 acres of permanently cleared land.** Most people find such **power lines unsightly, especially in a county that has marketed and regards itself as full of rural scenery**—as is obvious just from tourism brochures. High voltage utility lines detract from property values—I'm sure someone has done a study of this.

Constellation representatives have not to my knowledge explained to Calvert County how they will export the additional 1600 MW out of the County and into "the grid". **Supporters of the new reactor seem to believe that Unistar will be able to upgrade the existing corridor, without having to condemn**

additional land from adjacent property owners. In contrast to Constellation/Unistar, representatives of the MAPP project have indicated that they **do not intend to widen their 500 kV connector from Calvert Cliffs to Chalk Point**—rather, they intend to upgrade the cables and towers. MAPP also plans to embed a 500 kV connector at shallow subbottom depth under the Chesapeake, thereby creating a connection with the Eastern Shore.

When the existing transmission corridor was cleared and built in the early 1970s, Calvert County was largely rural. Today, it is largely suburban, with over 500 named subdivisions and towns. **Of the remaining undeveloped land, about 30,000 acres (out of 140,000 total County area) have been permanently preserved, some as nature preserves**. **Essentially no land had been preserved by the early 1970s. Therefore any widening of the transmission corridor would have extremely negative effects on adjacent homeowners and on land owners who have gone the extra mile to preserve their land privately, thinking it would be 'in perpetuity'. Perhaps the worst impacts would fall on the large area of nature preserve in the watersheds of Parkers Creek and Governors Run. The environmental viability of this preserve area is already negatively impacted by the existing corridors, which fragment the forested preserve. Thousands of people have put their private moneys and countless volunteer hours into saving this land in perpetuity—feeling assured their effort would be "for the ages". This aggregate preservation effort is one of the most successful, visible, and highly acclaimed of any in Maryland and the Chesapeake region—and has involved the American Chestnut Land Trust (a local land trust), The Nature Conservancy, the Maryland Department of Natural Resources, and others. Any clearing of additional forest, some of it exceptionally valuable habitat, would be a PR disaster for Unistar/Constellation, undermine confidence in the sanctity of land preservation, and damage the forest bioreserve/nature park. Calvert County, a national leader, prides itself in its land preservation efforts.**

The EIS needs to require any new reactor to export its power within the existing corridor. If necessary, pay the price of undergrounding—it's possible but costs more. Moreover, when comparing the impact of generating new power at Calvert Cliffs vs. at other potential sites, the **EIS needs to compare the lengths of transmission corridor required to get the power into the grid. This would include the added line losses, transmission line and tower construction and maintenance costs for a longer corridor**, **as well as the environmental costs of keeping natural forest from reclaiming the corridors.**

The EIS also needs to evaluate the risk and potential impacts from terrorist attacks on high voltage corridors. Although obviously no radioactivity release would be involved, these present relatively 'soft', not regularly patrolled targets, and effect large, even if relatively short- lived (how long?) disruptions in power, should a tower or two be blown up. Obviously shorter corridors with better visibility from adjacent roads would offer lower risks.

5) Demand Projections: Exaggerated need for new power plants?

Recent years have seen dramatic improvements in appliance efficiency (e.g., refrigerators), insulation, light bulbs, etc., paralleled by rapidly decreasing cost of solar photovoltaics (panel prices are declining at around 8% per year, largely due to reduced manufacturing costs caused by higher production volumes). Passive and PV solar, as well as ground source "geothermal", are very practical in the grid area served by the Calvert Cliffs Nuclear Power Plant. The State of Maryland, and independently the US government, have recently enacted more lucrative grant incentives to reduce what has heretofore been the main 'obstacle' to more widespread use of home-generated electric power: the start-up investment for the system and installation (never mind this will repay itself after a few years).

The EIS needs to ask the following question: Given the above, would not the per capita demand (kW hr per year, say) or the per household residential demand decrease at a rate equal to or exceeding the ca. 1% population growth rate? If the answer is yes, no additional power plants are needed, nuclear or otherwise. True, in recent years per capita demand in Maryland has risen, but extrapolating this trend into the future is scarcely unjustified. From the 90s to about 2006, a real estate boom and price bubble, fueled by low oil costs and low interest rates, generated an unsustainable expansion in house size (area), which is one main measure of electricity consumption. Even a "green" house of 4,000 sq ft will consume more energy than a house half that size with only middling insulation etc. McMansion energy use, especially electricity, will go up even faster than area, all else being equal, due to the geometric complexity of large houses (for aesthetic purposes), which creates more exterior surface area through which to lose winter heat and gain summer heat. The EIS can and must get actual estimates and quantify these relationships for the grid area to be served. What with newly available grants for clean renewable energy, reduced large-house salability, foreclosures, and a likely glut of large houses, as well as changing public awareness/fashions, will almost certainly slow, stop and even reverse the recent trend to higher per capita electricity demand.

In sum, the EIS needs to evaluate the likelihood that in the Mid-Atlantic grid area, per capita kWhrs/yr will level or has already leveled off, as it already did in California in 1973-74. In those years, again due to the Arab oil embargo, the rate of increase of per capita electricity demand slowed for the US as a whole, and appears to have leveled off to around zero in the last few years. This happened despite the fact that oil is not a major source of electric power. EIS needs to await and include demand data for 2006, 2007 and 2008 to see if in fact the per capita demand has leveled off or even decreased, as fewer large houses are built. Using largely the "bubble" demand years in projections is likely to greatly exaggerate the projected need and immediacy for new power plants. The point is that even total US energy demand can level off and decrease; projections using data prior to Oct 1973 would have forecast a need for far more power plants that were actually necessary. I believe oil prices (passing $100 per barrel early this year) and other considerations will turn out to effect a long-term or even permanent change in our per capita energy demand, just as was true in 1973-74 and 1979-80. The explosive increase in average house size and % McMansions was facilitated by the low and stable oil prices and of course for some time also low interest rates from 1986 through ca. 2003. A speculative bubble was created. It should not take rocket science for the EIS to allow for this bubble effect for the purpose of credible demand projections.

Initiatives taken by Maryland state government in 2007 aim to cut per capita electric consumption by 15% by the year 2015. Even if this goal is missed, what can easily be achieved can and probably will offset the 1% population growth rate. How close Maryland will come to reaching this goal cannot be evaluated/predicted just a year after the new measures were enacted. It is reasonable to expect that progress can be evaluated after 3 years, i.e. by 2010.

6) **Alternative clean and renewable electric energy**: Most will agree that we have to arrest greenhouse gas emissions from fossil carbon fuels, because of likely widespread adverse impacts caused by resultant climate change. The mere fact that nuclear power greatly reduces CO2 emissions does not by itself justify the US renaissance of nuclear power plants advocated by the nuclear industry/lobby and financially "greased" by EPACT. If nuclear were the only viable alternative to current CO2-emitting coal-fired plants, most would agree we need more nuclear power plants. However, nuclear is absolutely not the only alternative, and is arguably the most risky and environmentally hazardous alternative.

At present, the US imports more than 70% of the U-235-enriched uranium used to power most of its nuclear power plants. The EIS needs to evaluate the risks of depending on such imported nuclear fuel, and to consider the tradeoffs and impacts in expanding uranium mining in the US. The EIS needs also to evaluate carbon sequestration (to offset CO2 emissions from coal) and better scrubbing of other pollutants from coal, which the US has in abundance. Coal-fired plants are not inviting terrorist targets, there is no long-term waste issue, and many US jobs depend on coal mining, transport, and utilization.

For a commodity as important as electricity, pie- in- the- sky projections would be irresponsible. For example, it is safe to assume that nuclear fusion reactors will still not be operational even in the middle of this century (if ever). However, PV solar, ground-source geothermal, and solar passive air or water heating are not rocket science— only the start-up investment and public inertia has slowed their acceptance.

Recent trends in solar photovoltaic electric generation technology and pricing are dramatic. The EIS needs to extrapolate these trends not just to the time a potential third reactor would go on line (2015?) but for the probable lifetime of such a reactor (2075?). Will nuclear power become a dinosaur by mid-century? If so, will it be too costly to dismantle such a plant (none of the size even of Calvert Cliffs Units 1 and 2 have ever been dismantled—this would cost billions of dollars). Solar power will never cover ALL our electricity needs, but will become a significant fraction of the total power mix. Solar energy by itself is completely free and clean, and will be available for some billions of years! The US is lagging behind some other industrialized countries (e.g., Germany and Japan) in exploiting solar energy; **the grid region served by Calvert Cliffs gets considerably more sunshine per year than Germany.** With its generally plentiful sunshine and large area, the US is poised, currently lacking only political will, to take over the global lead in solar; states led by California have already embarked on massive expansions of residential and other solar photovoltaic systems. **These expansions will drive down unit prices by simple economy of scale. What is happening in Germany, Japan and California will influence what can happen in the local grid region.**

Subsidized expansion of nuclear power competes with and undermines development and expansion of clean renewable energy.

Respectfully submitted,

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