Concern	Response	Studies/References
The 1.8 million photovoltaic solar panels will contain approximately 100,000 pounds of Cadmium, which is a highly toxic carcinogen.	"Cadmium telluride (CdTe) is not the same as cadmium. CdTe is a stable compound that is not soluble in water (solubility product Ksp of 9.5x10-35) and remains solid at high temperatures up to ~1000◦C or ~2000◦ F (3X higher than cadmium). Toxicity studies show that CdTe's acute inhalation and oral toxicity are orders of magnitude lower than that of cadmium. CdTe has a low acute aquatic toxicity due to its insolubility in water. CdTe has shown no mutagenic activity (i.e. ability to change DNA which is a precursor to carcinogenicity) when tested on bacteria in Ames test. CdTe has shown no short-term reproductive and developmental effects on rats. "	ftp://ftp.co.imperial.ca.us/icpds/eir/campo-verde-solar/final/evaluating-toxicity.pdf
sPower denies any health risk from the Cadmium in the panels, but scientific studies show that	"This concern refers to a study conducted by Stuttgart University in Germany which submerged broken module pieces in citric acid solution	https://doi.org/10.1002/(SICI)1099-159X(199803/04)6:2<99::AID-PIP211>3.0.CO;2-Q

leaching of Cadmium from broken panels occurs over time. Scientific studies show very high quantities of Cadmium can leach out in a few months in acidic conditions. Our soil and Virginia clay are acidic, so rapid and thorough cleanup of any damaged Cadmium-containing panels is critical.	(pH 3), i.e. conditions similar to a PV recycling process but not real-world field conditions. Testing of broken PV modules with actual rainwater found no critical increase in soil concentrations after 1 year of leaching. "	
The soil in our area is not hydric, so rainwater will not percolate into the soil, but instead will rapidly runoff the Virginia clay which will be exposed by regrading the site. If the runoff contains such materials, big problems might arise such as water contamination, killing of fish and the endangered dwarf wedgemussel, etc.	Aquatic toxicity testing with CdTe showed no adverse effects on fish.	ftp://ftp.co.imperial.ca.us/icpds/eir/campo-verde-solar/final/evaluating-toxicity.pdf

Severe weather such as a tornado, hurricane, or derecho -- now somewhat common occurrences in central Virginia, and typically accompanied by heavy rains – could cause widespread destruction of solar panels and subsequent leaching of Cadmium, followed by toxic and carcinogenic runoff into Spotsylvania's water supply.	A 2013 study by The University of Tokyo evaluated the potential environmental, health and safety risks of CdTe PV systems in the event of a natural disaster such as an earthquake, tsunami, or large fire. The study concluded that even in worst case scenarios, the environmental risks from CdTe PV systems impacted by an earthquake, tsunami or fire would be minimal due to CdTe's insolubility in water, limited emissions in case of fire, the robust design of the modules as well as its low CdTe content.	http://matsuno-lab.tu.chiba-u.ac.jp/files/FS%20Tsunami%20Risk%20Review%20English.pdf
	A number of projects using CdTe PV modules in North Carolina, Florida, and Puerto Rico sustained little to no damage during Hurricanes Florence, Michael, and Category 5 Maria, respectively.	http://www.digitaljournal.com/news/environment/solar-power-proves-to-be-tougher-than-conventional-power-plants/article/532874
		https://sonnedix.com/news/sonnedix-and-yarotek-reach-commecial-operation-of-16-megawatt-photovoltaic-solar-energy-project-in-puerto-rico/
		https://sonnedix.com/impact/give-it-up-for-puerto-rico/
		http://energia.pr.gov/wp-content/uploads/2017/12/IN20170002A59-COMENTARIOS-Horizon-Energy-LLC.pdf
		http://gamechangesolar.com/news-gamechange-hurricane-michael.php

sPower has not produced any scientific reports that show what happens to the Cadmium contained in solar panels during such a catastrophic event. We know that tornados and hurricanes have hit large solar plants - where are the scientific reports of what was found, and how it was cleaned up?	Module damage caused by a tornado in California was followed by a cleanup with most of the modules recycled, and an environmental watchdog group reported there is no evidence of environmental contamination.	http://www.basinandrangewatch.org/DesertSunlight.html
Extreme natural events such as those above, as well as high winds, hail, forest fires, etc., could damage the solar panels and lead to the catastrophic release of toxins into the air, soil and water.	"The CdTe PV module consists of a sheet of glass on the front and a sheet of glass on the back, with the solid-state semiconductor encapsulated in the middle. There are no liquids or vapors contained in the panels. Modules are constructed and tested ((UL 1703, IEC 61646, IEC 61730) to withstand harsh operating conditions such as high winds and hail. While glass can break or crack, the	http://www.novapublishers.org/catalog/product_info.php?products_id=50605

	device is very difficult to break open – meaning to separate the front and back glass. There is 725 pounds of strength per square inch holding together the front and back glass in the PV module. Experimental crushing by a landfill compactor with a contact load of 50 tons did not break open the module, as the glass-laminate-glass bond of broken module pieces was maintained. "	
An Emergency Response Plan is needed to 1) ensure emergency responders are prepared to handle the dangerous situations, 2) the public is notified immediately of potential health and safety risks, and 3) funding is readily available to clean up and repair any damage and fully	Experimental analysis indicates potential Cd emissions from CdTe PV modules involved in a fire would be negligible as the majority of CdTe would remain encapsulated in glass. Heating experiments simulating residential fires showed that 99.96% of the Cd content of CdTe PV modules would be encapsulated in molten glass under the high temperatures of a building fire (800 to 1100˚C).	https://onlinelibrary.wiley.com/doi/epdf/10.1002/pip.624

remediate any toxic contamination.		
	Even in a worst-case scenario that assumes total release of more than four times the amount of CdTe contained in today's modules, a large fire area, and the shortest distance from the emission site, the calculated air concentration is still below conservative air pollution exposure limits for the public and emergency responders.	https://www.lfu.bayern.de/luft/doc/pvbraende.pdf
	"If a fire starts in the area of a PV system, to protect firefighters and mitigate hazards, research and analyses are available to provide information on how to deal with PV components during and after firefighting. This information has been disseminated as guidelines to firefighters, PV system installers, operation and maintenance providers, and PV users. "	www.iea-pvps.org/index.php?id=449

sPower recently stated that they will use some MonoPERC panels, which are crystalline silicon and do not contain any Cadmium. The MonoPERC panels are 10-20% more efficient than the CdTe panels, so they will require less land (hundreds of acres less). However, they are more expensive. It should be noted that the risks associated with Cadmium would be eliminated – if sPower used more environmentally friendly panels.	CdTe PV technology has the lowest life cycle environmental impact of all PV technologies (including in terms of human- and eco-toxicity which is largely attributed to the use of copper in PV systems). The environmental impacts of renewable technologies such as solar and wind are significantly lower than other power generating technologies such as coal in terms of greenhouse gas emissions, particulate matter, ecotoxicity, human toxicity, and euthrophication/water impacts.	https://www.pnas.org/content/pnas/112/20/6277.full.pdf
	The efficiency of CdTe PV modules has dramatically improved over the years with current efficiencies of 17-18%. A record efficiency of 22.1% for CdTe PV cells is documented in NREL's chart of best research cell efficiency.	https://www.nrel.gov/pv/assets/pdfs/best-reserch-cell-efficiencies.pdf

	CdTe PV modules have a superior energy yield in hot and humid climates due to its low temperature coefficient (which reduces power losses at higher temperatures) and narrower spectral response (which makes it less susceptible to dips in power that occur due to light absorption of water vapor in the atmosphere). As a result CdTe PV modules can produce more annual energy from the same system wattage than mono crystalline silicon modules.	https://doi.org/10.1016/j.joule.2017.11.012