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Subject: [Recommendation 2011-1/Safety Culture/Public Comments to DOE response] WTP Nuclear Safety Concern

George ferriter sent a message using the contact form at http://www.dnfsb.gov/website-tools/contact.

The following information applies to the application of a diesel engine as opposed to a gas turbine into a nuclear class 1E or other safety related application, such as the WTP at Hanford:

There exist several compelling technical arguments that support application of diesel engines as prime movers in emergency power applications within nuclear facilities to the exclusion of other machines. The principal, underlying, and strongest arguments in favor of diesel power are proven reliability and minimum risk.

There is a reason the diesel engine has been used exclusively as the standby emergency power supply since the inception of the nuclear power industry, and that resides in the machine's long history of service in difficult environments and under the most demanding service requirements There has never been another prime mover that has been qualified to any combination of the operational requirements of IEEE-387, to the environmental requirements of IEEE-323, or to the seismic qualification requirements of IEEE-344. Diesel engines have been designed and constructed to meet all three, and objective data demonstrates that many EDG sets have been manufactured meeting these rigorous standards. No other prime mover can make that claim.

Several NRC and industry sponsored studies have examined, measured, and quantified Diesel Generator reliability. These evaluations, most notably NSAC 108, and EPRI NP-2433 support the extraordinary reliability of these machines in nuclear service. It is important to note that these reliability standards do not embrace other types of prime movers, and there is a reason for this. Other prime movers cannot perform and sustain performance under accident or design basis event the way a diesel can.

All nuclear facilities undergo a strict analytical evaluation regarding nuclear safety. Once again, the demonstrable and proven reliability of the Diesel engine has been a key element in determining plant safety, and risk mitigation. (Here risk is defined as the risk to the health and well being of the public.) No other machine can approach the ability of a diesel to withstand plant casualties, or other events such as earthquakes or natural disasters, and yet support the safe control of the associated nuclear facility. To introduce a new, different, and essentially unproven technology into the site nuclear safety equation is to introduce an unknown of some considerable risk.

Mitsubishi Heavy Industries and their subsidiary Mitsubishi Nuclear Energy Services (MNES) has been working to obtain NRC approval of a nuclear safety related (Class 1E) gas turbine, (GT). The reliability of the Japanese product cannot be gauged per NSAC 108 standards, and there is zero domestic history of these machines in nuclear service. Of singular note is the need for a 1E subsystem necessary to bridge the time gap between plant casualty and power availability from the gas turbine – a fact that taken alone multiplies technical and safety risk. This would be a non-domestic sourcing, with attendant risk. Every putative technical advantage of the GT over the EDG stated by MNES in the many reports and communications made by this company in dialog with the NRC can be directly rebutted.

The notion that simply applying an aircraft engine into a GTG and declaring the machine to be of great reliability is fallacious. Airplanes fall out of the sky, and sometimes that is the result of jet engine (gas turbine) failure. There are singular and technically challenging failures and failure effects that are unique to gas turbines – mostly associated with the rotating, high temperature parts of the machine. Gas turbines may be touted as simple, but the technologies devoted to creating the high temperature parts of the machines are complex and sophisticated, indeed. Exotic materials, complex geometries, and precision manufacture all apply to these items, and yet these items are where most catastrophic gas turbine failures emanate from.

When a GT rotating assembly fails, the damage and collateral damage is often terribly violent. Nuclear plants often are mandated to have external missile barriers designed to protect sensitive equipment from wind borne debris. What protections must be required inside the plant to protect essential equipment and personnel from metallic missiles spawned by an 18,000 RPM turbine experiencing catastrophic failure?

There are many other criticisms of GTG as applied in nuclear facilities that may be identified and supported. Among these is the ability of a plant to recover from a GTG casualty – especially if this involves catastrophic failure of a rotating assembly. There exists no credible way to conduct repairs of such items locally. The possibility of replacing an entire engine exists, but as these are tandem units, this would require a dual replacement in the event that debris from the first failure destroys the tandem unit.

In the wake of the Fukushima disaster, the U.S. NRC has released a set of new and augmented safety guidelines for nuclear facilities. These include strengthening the reliability and availability of emergency onsite power sources. There is only a one proven pathway to meet these requirements, and that is through application of diesel engine technology. Any other approach degrades safety and increases risk.

The safety implications of applying a gas turbine generator into a nuclear safety related role is not sufficiently understood.

As a concerned citizen, I request that the DOE, and the NRC, more completely analyze and report on every new and different aspect of potential gas turbine failures if such machines find application within any nuclear facility as Safety-related / Class 1E components. This specifically includes the several nuclear materials facilities being built at the Hanford site. The recent criticisms of the DOE and their principal contractor, Bechtel National, involving a lax culture towards nuclear safety are clearly underscored by considering this technology for application with the WTP facility.

Please direct your deserving attention to this issue,

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