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Specializing in Laboratory/Biotech EH&S and Facilities: Industrial Hygiene, Biosafety, Chemical Safety, Radiation Licenses, HazMat Business Plans & Occupancy Permits, Hazardous Materials Inventories for Building Code & Fire Control Zone Compliance; Hazardous Waste, Training, IACUCs, & build-outs/moves/closures.

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June 16, 2014

Community Development Department  
City of Alameda  
2263 Santa Clara Avenue, Room 190  
Alameda, CA 94501

**RE: Silane Use @ Sila Nanotechnologies, Inc. (CUP Application Attachment Letter)**

To Whom It May Concern:

This is written to: (1) provide some basic information on silane gas and its associated hazards; and, (2) to address concerns that may arise as it applies to the requested use of silane by Sila Nanotechnologies, Inc. at a facility located in the city of Alameda at 2450 Mariner Square Loop.

As explained in the American National Standards Institute/ Compressed Gas Association (ANSI/CGA) Publication G-13-2006 "Storage and Handling of Silane and Silane Mixtures," second edition (and many other sources):

- Silane is a colorless, pyrophoric gas that is able to burn at concentrations from 1.37% to 96% volume in air. At concentrations between 1.37% and about 4.5%, mixtures can react if an ignition source is provided. Pyrophoric means that it reacts with air; i.e., will self-ignite in air with a visible flame upon release.
- When the silane concentration in air is greater than about 4.5%, the mixture is metastable (at an intermediate stage of stability) and will undergo bulk autoignition after a certain delay, and with shorter ignition delays at higher concentrations (as Sila Nanotechnologies will have).
- Due to the nature of the reaction, silane does not always ignite when vented to the atmosphere.
- It has been reported to have a repulsive odor; however, odor is not to be relied upon as a means to indicate the presence or absence of silane.
- Silane has no other hazardous properties. It is NOT toxic or corrosive.

The use of the pyrophoric gas silane as a source of silicon has grown with its consumption by semiconductor manufacturers, producers of solar cells, and allied technologies. Systems once imagined to be rare are now commonplace and are in use worldwide. Accordingly, over the last few decades, silane has been the subject of many technical studies by users and suppliers alike. As a result, many regulations and best practices have been set into place to ensure safety. Sila Nanotechnologies commits to full compliance with all these required and suggested control measures.

These control measures center around the following three practices:

1. The use of gas cabinets for any INDOOR storage and use of silane; and, the use of a secured, OUTDOOR ONLY enclosure for the storage and use any bulk silane system (or any amount over 100 cubic feet). *[This ensures maximum safety and security.]*
2. The use of minimum separation distances to minimize risk to property and personnel in the event of an inadvertent release. *[The distances determined recognize the probability for immediate ignition as well as the probability of latent ignition with its potential explosive.]*
3. The application of specific engineering and administrative controls to prevent the release of the material. *[This especially allows the users to handle this material at a reduced level of risk.]*

It is therefore my professional opinion that Sila Nanotechnologies' use of silane gas at this facility presents: (1) a negligible risk level to both business neighbors and the public; and, (2) a manageable, low risk level to the personnel and contractors at the facility who actually handle and work with the silane.

I trust this is helpful and addresses any safety concerns. If you have further questions, you may reach me by phone at 925-370-1020 (cell: 510-912-1909) or by email at [rene.r@comcast.net](mailto:rene.r@comcast.net).

Respectfully,



Rene Ricks, MPH, CIH