

## UPDATED INFORMATIVE DIGEST

### ADOPTION OF THE REGULATION TO REDUCE SULFUR HEXAFLUORIDE EMISSIONS FROM GAS INSULATED SWITCHGEAR

#### Sections Affected

Adoption of California Code of Regulations, title 17, division 3, chapter 1, subchapter 10, article 4, subarticle 3.1., Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear, sections 95350, 95351, 95352, 95353, 95354, 95355, 95356, 95357, 95358, and 95359.

#### Background

Governor Schwarzenegger signed the California Global Warming Solutions Act of 2006 (AB 32) on September 27, 2006. When the Legislature adopted AB 32, it declared that global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. AB 32 directed ARB to establish a statewide greenhouse gas (GHG) emissions limit for 2020 based on 1990 emissions.

AB 32 directs the Board to carry out specific tasks related to reducing GHG emissions. These tasks include monitoring GHG emissions, implementing a program of annual reporting of GHG emissions from GHG emission sources, and accounting for all GHG emissions, including emissions from electricity generated in California or imported from other states, providing reporting tools for such data, and ensuring emitting sources maintain records of GHG emissions.

AB 32 directed ARB to adopt a Scoping Plan by January 1, 2009, that shows how emission reductions will be achieved from significant GHG sources through regulations, market mechanisms, and other actions. The Scoping Plan identifies the regulation for reduction of SF<sub>6</sub> from electrical equipment as a possible GHG emission reduction measure. ARB and other State agencies are now developing and implementing proposed measures to meet the State's GHG emission reduction goals.

SF<sub>6</sub> is a colorless, odorless, nontoxic, and nonflammable gas with a global warming potential that is 23,900 times that of carbon dioxide (CO<sub>2</sub>). Since the 1980s, SF<sub>6</sub> has been used extensively in electrical power systems as a dielectric medium (insulator) and interrupter (arc quencher) in medium and high voltage gas insulated switchgear or "GIS." The term switchgear, used in association with the electric power system, refers to the combination of electrical switches, disconnects, fuses and/or circuit breakers used to isolate electrical equipment. This equipment is commonly found in electrical substations and can be located either above or below ground in protected vaults. Nearly 80 percent of California's SF<sub>6</sub> emissions result from leakage and handling losses from GIS.

Worldwide, only the European Commission currently regulates SF<sub>6</sub> use in GIS. Nationally, in 1999, the United States Environmental Protection Agency (U.S. EPA) created a voluntary SF<sub>6</sub> emission reduction program which has been effective in gaining substantial emission reductions from its participants. However, because this is a voluntary program, only five of California's utilities and power producers are active in the U.S. EPA's voluntary program.

Although a potent greenhouse gas, SF<sub>6</sub> has properties that allow the optimized operation of electrical switchgear and electricity networks throughout California. Despite international research efforts, no equivalent alternative has been identified, nor is currently available. Because of its simplicity and cost-effectiveness, this measure may influence future national and international SF<sub>6</sub> regulations.

### **Description of the Regulatory Action**

The Board adopted a regulation which requires owners of gas insulated switchgear (GIS) to establish an initial, maximum emission rate of ten percent of their nameplate capacity of SF<sub>6</sub> by January 1, 2011. GIS owners are required to continually reduce SF<sub>6</sub> emission rates by one-percent-per-year over the following nine-year period beginning in 2011 and ending in 2020. The maximum emission rate in 2020 is set at one percent. This time period coincides with the timeline established by the Global Warming Solutions Act (Health & Safety Code §§ 35800 *et seq.*) to meet GHG emission reductions.

Specific methods to attain required emission reductions are not set out in the regulation. Rather, affected entities determine which methods they will employ to meet the requirements. Currently, least-cost gas management techniques employed nationally and globally include technician training, SF<sub>6</sub> leak detection and repair, gas recycling, equipment evacuation, and equipment refurbishment or replacement. The following summarizes these established gas management techniques.

*Leak Detection and Repair (LDAR).* SF<sub>6</sub> leak detection is achieved using various techniques, including “sniffing” for gas with SF<sub>6</sub> gas sensors and using laser-based remote sensing technology. LDAR-based repairs address small leaks on specific components such as that from a bushing or flange gasket.

*SF<sub>6</sub> Recycling.* Recycling gas cart systems are available that can withdraw, purify, and return SF<sub>6</sub> to gas-insulated equipment.

*Evacuation of Equipment.* Evacuation attains a high level of SF<sub>6</sub> recovery from closed-pressure equipment.

*Equipment Refurbishment.* Equipment refurbishment encompasses comprehensive repairs for large leakage losses. Refurbishment consists of disassembling, rebuilding and possibly upgrading equipment using remachined,

cleaned, and/or new components. Generally, equipment refurbishment represents a less expensive option than equipment replacement.  
*Equipment Replacement.* Equipment replacement is undertaken when equipment parts are no longer available or when refurbishment will not correct leakage problems.

### *Applicability*

The regulation affects approximately 75 private and public entities including six investor owned utilities, approximately 50 publically-owned utilities and rural electric cooperatives, one State agency (Department of Water Resources), and three federal agencies.

### *Standards*

The regulation establishes maximum annual SF<sub>6</sub> emission rates for GIS owners. The emission rate requirements begin in 2011 at ten percent of the GIS owners' total equipment capacity averaged over the year. The emission rate steadily declines by one percent per year until 2020. Beginning in 2020, the SF<sub>6</sub> emission rate is set at one percent.

### *Exemptions*

Beginning in 2020 emissions due to an "emergency event" could be exempted from the emission rate calculation for that year, if those emissions cause the one percent emission rate limit to be exceeded. GIS owners are required to demonstrate to the Executive Officer that the emergency event causing the emission rate to be exceeded was beyond the control of the GIS owner.

### *Recordkeeping and Reporting*

The regulation requires GIS owners annually to: (1) report their SF<sub>6</sub> emissions and emission rate; and (2) provide a complete inventory of all gas containers and GIS equipment. GIS owners are also required to maintain and have this information available for ARB enforcement staff for inspection and verification.

## **COMPARABLE FEDERAL REGULATIONS**

There are no federal regulations that mandate the reduction of SF<sub>6</sub> from GIS.