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## CELLPHONES POSE NO GAS STATION HAZARD

**Some people have asserted** that the use of cellphones should be banned when drivers refuel their cars at gasoline stations. Cellphone signals, they say, can ignite gas fumes and cause a fire or explosion.

Concern about cellphone safety at gas stations arose from anecdotal reports circulated on the Internet and by the media. The first report dates to about 1993 and may have originated in Southeast Asia. But no scientific evidence has shown that danger exists, and we are unaware that any confirmed incident has ever occurred anywhere in the world.

A 1999 study by Exponent Failure Analysis Associates ([http://www.exponent.com/practices/health/emf\\_rf\\_projects.html](http://www.exponent.com/practices/health/emf_rf_projects.html)) found that normal operation of a cellphone at gas stations represents “a negligible hazard.” Further, a literature search found no evidence of fires or explosions at gas stations caused by a cellphone.

Another study (University of Oklahoma, Wireless EMC Center, “Investigation of the Potential for Wireless Phones to Cause Explosions at Gas Stations,” 1999) considered the potential impact of radio frequency (RF) energy and electrostatic discharge (or a spark) from a cellphone. The study’s

conclusions completely eliminated “RF emissions...as a potential hazard.” It also considered the possibility of a cellphone battery causing an explosion and concluded that this also posed no hazard.

Several makers of cellphones still do caution consumers about gas stations in their product manuals. They describe the remote chance of sparks from a dislodged battery (which has no connection to the RF emissions from the phone). But in light of analyses such as those described here, other phone manufacturers have removed the cautionary language from their manuals.

Perhaps confusing the situation is the “Stop Static” awareness campaign of the Petroleum Equipment Institute and the American Petroleum Institute (<http://www.pei.org/static/index.htm>).

The campaign’s aim is to increase public awareness of the known hazard posed by electrostatic sparks that can be generated by gas station patrons. But this campaign clearly distinguishes between the hazard of static discharge and the cellphone rumors. “Our report has nothing to do with cellphones whatsoever,” notes the Petroleum Equipment Institute, which says it has not documented a single case of cellphones causing fires at gas stations.

An incident in 2002, on an offshore oil rig in the Gulf of

Mexico, led to initial concern that use of a cellphone may have ignited a flash fire during a routine inspection of a master control panel that used a gas in the instrumentation. This event triggered the release of an alert by the U.S. Mine Safety Health Administration and a subsequent investigation by the Minerals Management Service (MMS; <http://www.msha.gov/alerts/PotentialCell.htm>), part of the U.S. Department of the Interior. MMS inspected the control panel and had a third-party laboratory conduct tests in which the cellphone in question and an identical model were placed in explosive atmospheres of oxygen-enriched propane and methane.

Tests by the lab involved turning the phone on and off, using its two-way paging function, removing the cellphone battery with the power on, and removing and reinstalling it with the power off. The gas mixture never ignited, and the lab concluded that the cellphone did not cause the flash fire. The MMS found it impossible to conclusively identify the source of the fire, but suggested that static electricity may have been the cause.

Ignition of gasoline vapor can take place only under three conditions, and they must occur simultaneously:

- A flammable fuel-air mixture must be present with-

in range of an RF-induced arc. But normal handling of gasoline does not produce a flammable atmosphere—under normal conditions air movement (wind) rapidly dilutes and disperses gasoline fuel vapors.

- The gap across which the arc occurs must be small. A gap of only about 0.5 millimeters is required to ignite a fuel-air mixture.

- The arc must contain enough energy to cause ignition. During explosive vapor tests it conducted, the U.S. Navy found that a volt-ampere product of 50 or more is required to ignite gasoline. This number can be reached only under conditions involving high-power communications transmitters producing hundreds to thousands of watts of power, and the transmitters must be close to the refueling areas. (Electromagnetic Radiation Hazards to Personnel, Fuel and Other Flammable Material. NAVSEA OP 3565/NAVAIR 16-1529/NAVELEX 0967-LP-624-6010, Vol. 1, October 2002).

It is extremely unlikely that these conditions will occur simultaneously near a gas station. So we must conclude that, as far as cellphones are concerned, there is nothing to worry about.

*This statement, initially written by Frank Colville, Ken H. Joyner, and George Andrew Koban, was revised and approved by COMAR, the IEEE Engineering in Medicine and Biology Society's Committee on Man and Radiation. It represents a consensus of its members. The committee is composed of experts on health and safety issues related to electromagnetic fields, from power line through microwave frequency ranges. Its mission is to disseminate authoritative information to the public relating to the safety of nonionizing electromagnetic fields and to correct misinformation that relates to public health on this topic.*