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Aviation Human Factors Industry News

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Update: B-2 Crash Caused By Waterlogged Sensors

click for video

The crash on takeoff of a 509th Air Wing, Air Force B-2 Spirit bomber, Feb. 23, operating at Andersen Air Force Base, Guam, was caused by water in the aircraft's sensors, according to an Air Combat report issued Thursday. Specifically, moisture in three port transducer units "distorted data introduced by a B-2 Spirit's air data system" that led to flawed information entering the bomber's flight control computers. The aircraft was reacting to inaccurate airspeed and a "perceived" negative angle of attack. This resulted in an "uncommanded 30 degree nose-high pitch-up on takeoff," according to the Air Force.

Major Ryan Link and Captain Justin Grieve, the aircraft's two pilots and the only two aboard, were unable to regain control and safely ejected just as the aircraft stalled and mushed into the ground and its left wing impacted the ground. The $1.4 billion aircraft crashed just off the left side of the runway and exploded. It was the first-ever B-2 crash and followed 75,000 hours of loss-free service. Link and Grieve both suffered injuries during ejection, with Grieve suffering compression fractures to his spine.

The report points to the inaccurate readings as contributing factors, adding that ineffective communication of critical information about a technique used to remove moisture from the sensors also contributed. It's possible that all the pilots had to do to avert the accident was turn on the pitot heat prior to performing air data calibrations. But the suggested technique was not part of checklist procedures.

Related Content:
Exclusive Video: B-2 Spirit Stealth Bomber Crash Technical Report

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Lack of proper vulnerability records contributed to B-2 crash.

Aviation Week reported, "Crews and maintainers never formally recorded information on a vulnerability involving the B-2's air pressure sensors and the simple workaround crews came up with to mitigate it, a crucial omission that set the stage for a Feb. 23 B-2 crashes in Guam." Flight maintenance teams became aware of "the sensors' susceptibility to moisture during a Guam deployment in 2006," and also "discovered that turning on the 500-degree pitot heat would quickly evaporate the water and the flight computer would receive normal readings." However, this "information was not formally 'captured' in maintenance or lessons-learned publications." As a "result,...by the 2008 deployment, the information was passed on by word of mouth so that 'some people knew about it and some people did not,'" said Maj. Gen. Floyd Carpenter, "president of the accident investigation board and vice commander of 8th Air Force."

Judge to allow punitive damages in Comair suits

Judge rules plaintiffs have enough evidence in crash

In a victory for the plaintiffs, a federal judge has ruled the estates of the victims of the crash of Comair Flight 5191 may seek punitive damages in a trial set for Aug. 4.

In an order made public yesterday, U.S. District Judge Karl Forester ruled there is enough evidence to allow a jury to decide if the airline's management was responsible for the August 2006 crash at Lexington's Blue Grass Airport that killed 49 people.

David Royse, a Lexington lawyer who is liaison counsel for the plaintiffs, said the ruling "provides an opportunity for the community to send a message about the conduct in this case."

Punitive damages are awarded to punish a wrongdoer and sometimes are many times the amount of actual damages awarded to compensate plaintiffs for their losses.

A spokeswoman for Comair, which vigorously opposed the ruling, did not respond to calls and pages.

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Comair admitted its pilots made mistakes in taking off from the wrong runway, but said it should not be subject to punitive damages because it did not "authorize or ratify" their conduct.

But Forester said the plaintiffs produced sufficient evidence that Comair's training and policies were negligent, including its failure to require pilots to look at their instruments to verify runway headings.

The National Transportation Safety Board ruled pilot error was the principal cause of the crash, which occurred seconds after the Comair jet tried to take off from the wrong runway, one that was unlit and too short for jetliners.

Comair said in court papers that it has "accepted responsibility for mistakes made by its crew," including the failure to maintain "situational awareness." But it said the airline had no reason to anticipate that Capt. Jeffrey Clay and First Officer James Polehinke "would fail to perform their duties."

The plaintiffs contended there was "overwhelming" evidence Comair was grossly negligent in its corporate oversight of its safety program and that the reckless operation of the aircraft was a "foreseeable consequence" of decisions by Comair management.

The plaintiffs also asserted that "a pilot is in the same position as a corporate officer who is control of corporate activities."

In allowing punitive damages to be decided by a jury, Forester noted the plaintiffs had presented evidence that Comair knew that one of its flight crews had previously taken off from a wrong runway; that it failed to adopt a written checklist to require cross-checking the runway heading; and that it had no policy prohibiting pilots from taking off on an unlit runway at night.

"It is the opinion of this court that these and other additional circumstances with the expert testimony in support are sufficient to raise a jury question as to whether Comair should have anticipated the conduct of its pilots," Forester said.

Bill Garmer, who represents the estates of Victoria Washington and Dan Mallory, said the plaintiffs are pleased with Forester's ruling and his analysis of the facts of the case.

About one-third of the lawsuits have been settled, but the rest are pending.

Although air crash cases are rarely tried, Garmer said "all the indications are now that there will be a trial on August 4th."

Clay died in the crash, and Polehinke, the lone survivor, was critically injured.

NTSB RECOMMENDS FAA ADDRESS FATIGUE MANAGEMENT SYSTEMS IN AVIATION

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Washington, DC -- The National Transportation Safety Board last week made two recommendations to the Federal Aviation Administration (FAA) to address human fatigue within airline operations. The Board recommended that the FAA develop guidance, based on empirical and scientific evidence, for operators to establish fatigue management systems, including information about the content and implementation of these systems.

The Board also made a recommendation to develop and use methodology that will continually assess the effectiveness of fatigue management systems implemented by operators, including their ability to improve sleep and alertness, mitigate performance errors, and prevent incidents and accidents.

"The Safety Board is extremely concerned about the risk and the unnecessary danger that is caused by fatigue in aviation," said NTSB Chairman Mark V. Rosenker. "We have seen too many accidents and incidents where human fatigue is a cause or contributing factor."

The Board's recommendations letter cites three accidents and an incident highlighting the danger of human fatigue within airline operations:

On October 19, 2004, Kirksville, Missouri, Corporate Airlines flight 5966 struck several trees on its final approach and crashed short of the airport. Both pilots and 11 passengers were killed. Two passengers received serious injuries.

On February 18, 2007, Delta Connection flight 6488, operated by Shuttle America, Inc., overran the end of the runway as it was landing at Cleveland-Hopkins International Airport. All 72 passengers and a crew of four deplaned without serious injury.

On April 12, 2007, Pinnacle Airlines flight 4712 ran off the runway after landing at Cherry Capital Airport, Traverse City, Michigan. None of the 49 passengers or crew of three were injured.

On February 13, 2008, Go! flight 1002, operated by Mesa Airlines, flew past its destination airport, General Lyman Field, Hilo, Hawaii. Air traffic control repeatedly attempted to contact the crew for over 18 minutes, as it flew over Maui, crossed the big island of Hawaii and headed southeast over the Pacific Ocean. The airplane traveled 26 nautical miles beyond its intended destination airport before the flight crew responded.

There were no injuries.

"It is imperative that the FAA take action to reduce human fatigue in airline operations," Rosenker said. "Addressing this safety related measure is long overdue. We must and can correct this serious concern."

The Safety Board's recommendation letter, including the recommendations, will be available on the website, www.ntsb.gov, under Board Meetings.

CALLBACK ASRS
From NASA's Aviation Safety Reporting System

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FAA willing to improve oversight of manufacturer-supplier relationships

After a scathing review released by a US government watchdog in February, the US FAA concedes that while it does not agree with all the findings, it does admit some changes in its oversight of manufacturer-supplier relationships could be necessary.

The report released by DOT's inspector general (IG), who examined quality control of domestic and foreign suppliers to US aerospace product manufacturers, indicated three out of five of those manufacturers had no standard procedure to visit their critical suppliers and sub-tier suppliers.

IG's also concluded that substandard parts entered into the aviation supply chain.

Today during the US/Europe International Aviation Safety Conference in St. Petersburg, Florida an IG representative explained that most of the deficiencies found at 21 supplier facilities examined by the agency were not categorized as "stop production" type issues, rather they centered more on areas such as training.

Still, FAA manager, airworthiness and production division Frank Paskiewicz, one of the agency officials who worked with IG after its assessment, says of the deficiencies uncovered, "I don't think we can ignore that", even if they were minor or isolated, he notes.

Paskiewicz stresses that FAA has a good system in place regarding manufacturer and supplier oversight, but also acknowledges the system in use today is "a few years old" and perhaps has not kept up with the international market.

Of the six recommendations stemming from IG's investigation, FAA agreed with five, and was in partial agreement with the recommendation to establish a requirement for manufacturers to develop criteria for on-site audits for initial supplier approval and to conduct periodic audits to guarantee quality assurance throughout the supply chain.

FAA says no regulation exist to mandate that requirement, "we monitor how well OEMs control supplier surveillance", says Paskiewicz.

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OEMs counter that audits are just one aspect of their management of suppliers. Chetan Date, director quality system and regulatory compliance at Honeywell explains that in the detection aspect of risk assessment, an audit is just one element of the process.

He notes that supplier performance also plays a factor. In addition, an OEM can receive supplier information from multiple sources including customers, third parties and regulators. All that data is entered into a risk assessment model, Date explains, adding: "It is how well you use the data that is important."

The IG focus in its review seemed to zero in too narrowly on the audit aspect of supplier management says Edward Bayne of Boeing supplier quality. Control of suppliers, he notes, entails much more than audits. Production approval holders not only have staff on site at suppliers but also have quality initiatives that contractually flow down the supply chain.

OEMs also counter that they are constantly improving on their "robust" supply chain control procedures, says Rockwell Collins director, enterprise supply chain quality Robert Lorenz.

Industry generally agrees with IG's recommendations stemming from its review, he says, yet also concurs that supply chain management encompasses more than audits. His company involves suppliers early on during the design process.

While conceding that FAA could improve some aspects of how manufacturers oversee suppliers, Paskiewicz also points to industry's safest aviation record ever, noting "you have to think OEM and supplier surveillance play a role in that".

CSB Presents 'Anatomy of a Disaster' Video, Examining BP Explosion

Three years after the explosion that killed 15 workers and injured 180 others at the BP Texas City refinery, the U.S. Chemical Safety Board has released a new, comprehensive safety video that describes the causes of the accident and key safety lessons. The 56-minute video, "Anatomy of a Disaster: Explosion at BP Texas City Refinery," is available for viewing in the Video Room of the CSB's Web site, www.Safetyvideos.gov. DVDs of the video will be provided at no charge through the online request form at www.CSB.gov.

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The incident occurred on March 23, 2005, during the startup of the refinery's octane-boosting isomerization unit, when a distillation tower and attached blowdown drum were overfilled with flammable liquid hydrocarbons. Because the blowdown drum vented directly to the atmosphere, there was a geyser-like release of flammable liquid, forming a vapor cloud that spread rapidly through the area. A diesel pickup truck that was idling nearby ignited the vapor, initiating a series of explosions and fires that swept through the unit and the surrounding area. Fatalities and injuries occurred in and around occupied work trailers, which were placed too close to the isomerization unit and which were not evacuated prior to the startup.

The safety video includes a nine-minute 3-D computer animation of the sequence of events that led to the explosion, as well as sections describing the refinery's safety culture, the human factor safety issues that contributed to the accident, and the importance of safe equipment design and trailer siting. The video also features interviews with key members of the CSB investigative team, who completed the 341-page public report on the causes of the accident approved by the Board at a public meeting in Texas City on March 20, 2007. In the video, CSB Board Member William Wright discusses the Board's safety recommendations from the accident and key safety lessons from the Board's investigation. Three outside safety experts also appear in the video to discuss their views of the long-term significance of the accident.

Airplane Heal Thyself? Self-Repairing Aircraft Could Improve Air Safety

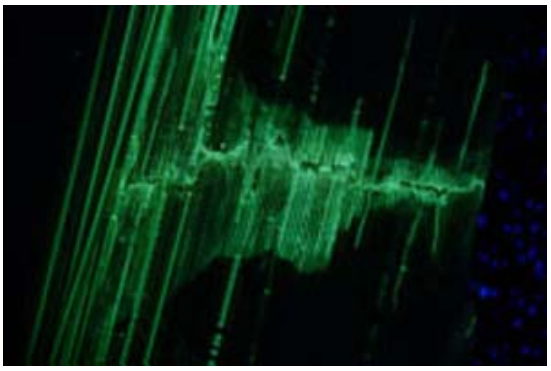
Airplanes get old, and over time their skins can develop tiny holes and cracks. Mechanics are good at spotting these problems during regular maintenance checks, but a technique developed in Britain that mimics natural healing could allow airplanes to repair themselves.

Researchers at the Engineering and Sciences Research Council are developing composite materials that "bleed" resin when stressed or damaged, effectively creating a "scab" that fixes the damage. It's an innovation that could drastically improve air safety, foster the development of lighter aircraft and bring biomimicry to aviation.
"This project represents just the first step", says Dr. Ian Bond, the aerospace professor leading the research.

"We're also developing systems where the healing agent isn't contained in individual glass fibers but actually moves around as part of a fully integrated vascular network, just like the circulatory systems found in animals and plants. Such a system could have its healing agent refilled or replaced and could repeatedly heal a structure throughout its lifetime. Furthermore, it offers potential for developing other biological-type functions in man-made structures, such as controlling temperature or distributing energy sources."

Think about the body's healing process and the technology behind self-healing plastics is easy to grasp.

When we cut ourselves, sticky cells called platelets clump together near the wound to create a plug that stops the bleeding and begins the healing. The principle behind the self-healing plastic Bond has developed at University of Bristol technique is remarkably similar. The composite material is made from hollow fibers filled with epoxy resin. When a hole or crack appears, the resin leaks out and seals the break and returns it to 80 to 90 percent of its original strength. The epoxy is colored, making it easy for mechanics to spot the repairs and make a permanent fix.



Slight damage incurred during flight (and we're talking a tiny tear or crack, not a gaping hole), would be fixed in the time that it takes a small cut to stop bleeding. "This approach can deal with small-scale damage that's not obvious to the naked eye but which might lead to serious failures in structural integrity if it escapes attention," Bond says. "It's intended to complement rather than replace conventional inspection and maintenance routines, which can readily pick up larger-scale damage, caused by a bird strike, for example."

Self-healing would improve the overall reliability and safety of fiber-reinforced polymers, making them a more acceptable alternative to aluminum. That would bring lighter - and more fuel efficient, therefore less polluting - airplanes, automobiles and spacecraft. The researchers believe the technology could be commercially adopted in about four years.

Photo of F-117A Nighthawk fighter by Flickr user James Gordon.
***Second photo, of fractured fiber-reinforced polymer under ultraviolet lighting to show how the resin "bleeds" into damaged areas, by Engineering and Sciences Research* Council.**

US FAA progresses toward safety management system framework

FAA is moving closer to solidifying its proposed adoption of an ICAO-designed safety management system (SMS), with an advanced notice of proposed rulemaking possibly being released within the next three-to-four months.

The ICAO SMS is a standard that calls on member states from January 1, 2009 to require operators as part of their overall safety programs to develop a SMS that at the least identifies safety hazards, identifies remedial action if necessary to maintain an acceptable level of safety, outlines continuous monitoring and regular assessment of the safety level achieved and aims for continuous improvement in the overall level of safety.

After collaborating with industry FAA has made available its SMS doctrine and SMS requirements online, said agency associate administrator for aviation safety Nick Sabatini earlier today at the US/Europe International Aviation Safety Conference in St. Petersburg, Florida.

Agency director of flight standard services Jim Ballough during the conference noted that FAA has already released a guidance document for air carriers regarding SMS, and in the process of working on similar documentation "for repair stations as well".

Sabatini explains that the agency is potentially examining one Federal Aviation Regulation (FAR) that covers stand-alone guidance for any operator, part 121 or 135, operating under the FAR system. He notes it could be a single place to "find the SMS requirement expected of you".

Other FAA staff at the conference noted an advanced notice of proposed rulemaking governing SMS could be issued within roughly 90 days. US air traffic controllers already use some SMS principles in their operations.

Sabatini underscores key tenets of SMS are data sharing and risk analysis in preempting potential incidents.

Canada was somewhat of a pioneer in SMS, starting the process around 1999. Merlin Preuss, director general of civil aviation for Transport Canada told conference attendees that this year the country is ending its three-year implementation of SMS for maintenance organizations and air carrier operators under rules promulgated in 2005.

Outlining Canada's SMS path, Preuss explains his organization underestimated the scrutiny the risk management approach garnered from Canadian legislators, noting he has testified around 20 times in front of legislative committees.

Preuss also notes that the Office of the Auditor General of Canada also recently published a report regarding the TCCA's implementation of SMS

In the report the Auditor General states: "We examined Transport Canada's management of the transition to the new approach for the first sectors to make the shift. We did not examine the level of air transportation safety in Canada. Nor did we look at security—that is, protection against deliberate acts of terrorism."

Categorizing the report as "not terribly damaging" Preuss says that seven of the nine recommendations published in the assessment had already been identified by his agency as gaps in the system.

Canada is "on the way" to promulgating SMS rules for air traffic suppliers and airports, says Preuss, with the goal of having the "whole gambit" of the industry, including smaller airports, air taxi operators and manufacturers under SMS by 2010.

Pointing to the Canadian implementation of SMS, Preuss warns it is not "a turnkey operation", noting the implementation takes time and effort.

FAA also appears to recognize some challenges in SMS on a global scale. Sabatini explains it is unconscionable to believe one repair station with approvals for work from 15 different countries would need to implement the same number of SMS capabilities. The FAA official says it is a complex system, yet also stresses it is critically important for data to flow through aviation system users, characterizing that as the "life blood" of SMS.

Obstacles hold back use of drones in US skies: watchdog

The MQ-9 Predator B, an unmanned surveillance aircraft system unveiled by the US Customs and Border Protection

Despite growing demand for unmanned aircraft, technological and regulatory obstacles may keep them from routinely sharing US skies with piloted aircraft before 2020, a government watchdog said Friday.

In a new report, the Government Accountability Office said the US military's experience in Iraq and Afghanistan is generating both trained operators and an industrial base to support the expanded domestic use of unmanned aircraft.

Local authorities want to use them to spot fires or keep watch over crime scenes, and commercial interest has grown as well, according to the report.

But significant technological and regulatory challenges still stand in the way of safely mixing unmanned aircraft with piloted aircraft, it said.

"No technology has been identified as a suitable substitute for a person on board the aircraft in seeing and avoiding other aircraft," the report said.

Their communications and control links are vulnerable to intentional or unintentional interference that could cause a crash, and ground control stations may need to be protected against hostile takeovers.

Reliability of components in unmanned aircraft systems (UAS) is another problem, according to the report.

"Our analysis of four and a half years of DOD's (Department of Defense) data indicates that UAS component failures caused about 65 percent of the accidents and human factors issues -- a common challenge in new technology -- caused about 17 percent of the accidents," it said.

Unmanned aircraft are currently limited in the United States to border patrol operations and scientific data gathering with special case-by-case approval by the Federal Aviation Administration.

The report said various federal agencies are taking steps to deal with the barriers to wider use of unmanned aircraft for domestic missions.

The FAA, for instance, is sponsoring research on technologies that deal with the "detect, sense and avoid" issues, and is trying to obtain dedicated radio frequency spectrum for unmanned aircraft operations, the report said.

A federal advisory board is developing technical standards of unmanned aircraft.

But the report said: "Fully addressing regulatory challenges to allowing all UASs to have routine access to national airspace may not occur until 2020."

The impact of unmanned aircraft on the national airspace system remains speculative, but studies have warned they could be disruptive, the report said.

UASs pose unique challenges because, unlike manned aircraft, they often hover or circle in one location and have speed, maneuverability and climb rates that may differ from manned aircraft.

"These differences could affect air traffic flow, air traffic controller workload, and departure and arrival procedures," the report said.

They also would likely add to the volume of air traffic, it said.

On the other hand, they might be quieter and produce less emissions than manned aircraft performing the same tasks, the report said.

2008 Human Factors Symposium

The 20th FAA/ATA International Symposium
on Human Factors in Maintenance and Ramp Safety

September 3-4, 2008
Evening Reception Sponsored by Boeing on September 2, 2008
Hyatt Regency Orlando International Airport Hotel
Orlando, Florida, USA

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This year marks the 20th anniversary of the FAA/ATA International Symposium on Human Factors in Maintenance and Ramp Safety. This exciting symposium creates a unique opportunity for HF experts, regulatory authorities, and airlines from around the world to meet and discuss pertinent maintenance and ramp human factors (HF) issues, methodologies, and safety.

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*****You will be charged a $250 penalty fee if you do NOT stay at the Hyatt Regency*****

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Refunds/Symposium Cancellation Policy

After your registration is confirmed, there will be a $50 handling fee applied to refunds requested and received by Friday, July 25, 2008; after this date, no refund of registration fees is available.

Symposium Draft Program

Click here to view a draft program for the 2008 Human Factors Symposium.

Got A Plane That Won't Fly? Build-A-Plane Kids Need It

It would seem reasonable that with some pilots parking their airplanes due to high fuel costs, Build A Plane would see an influx of donations for their program, which collects unwanted aircraft and gives them to schools (and gives the donor a tax deduction).

But in fact, the nonprofit group is facing a critical shortage of aircraft donations, according to Lyn Freeman, founder of the organization -- almost 200 schools are on a waiting list. "When schools have to wait that long to receive an airplane, sometimes they move on to a different area of interest, away from aviation," Freeman said this week. "We can't afford to have that happen, so we really, really need more aircraft donations." Build A Plane has helped kids at over 70 schools learn science, technology, engineering and mathematics by building real airplanes.

"It's amazing to see what happens when a Build A Plane aircraft shows up at a high school," says Katrina Bradshaw, the program's executive director. "Kids who have not even started to think about what they want to do when they grow up suddenly see a real airplane right in their classroom.

The next thing you know, kids are learning about the technology and math and engineering and the science of aviation, and then we see kids enroll in flying lessons, aviation technician programs and all kinds of things. It's really very exciting!" To donate an aircraft to Build A Plane or to learn more about its projects, go to BuildAPlane.org.

Pelican Lights

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Medical Malpractice: The Equivalent of a Full 747 Crashing Every Day

Last month, movie star (and part-time Austin resident) Dennis Quaid spent a considerable amount of time speaking to Congress about preemption. Quaid told Congress the oft-repeated story of his twins, and described how preemption, the silent tort-reform, threatens everyone's safety.

Since this brush with tragedy, I have found out that medication errors are unfortunately all too common. Approximately 100,000 U.S. patients die every year because of medical errors in hospitals alone. It's a toll we would never tolerate in aviation, nearly the equivalent of a full 747 crashing every single day.

I have also learned a lot about the legal system – and it was surprising, I have to tell you. Like many Americans, I believed that a big problem in our country was frivolous lawsuits.

But now I know that the courts are often the only path to justice for families that are harmed by the pharmaceutical industry and medical errors.

Yet the law is stacked against ordinary people.

For instance, in my home state of California, a 1975 law caps compensation to malpractice victims. The cap has never been raised for inflation. The practical effect is that people without the wealth to pay legal fees up front are unable to get their cases before a judge or jury.

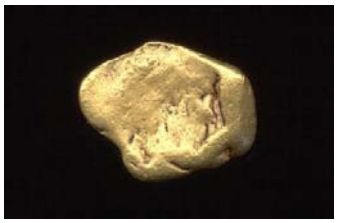
Now we face something with potential to be even more sweeping and even more unjust: federal preemption. The Supreme Court is about to decide whether to bar most lawsuits over drugs and their labeling, as long as the drug was approved for marketing by the FDA. After many years of rejecting arguments that FDA actions should preempt lawsuits involving injuries from products regulated by the FDA, White House appointees at the FDA reversed that position in 2002, and now argue that FDA approval immunizes the manufacturers of dangerous products from liability for the deaths and injuries they cause.

It is hard for me to imagine that this is what Congress intended. You tell me, Mr. Chairman: When it passed the Food, Drug, and Cosmetic Act in 1938, did Congress intend to give appointed bureaucrats at the FDA the right to protect a drug company from liability, even when the company cuts corners and jeopardizes our safety?

A federal ban on lawsuits against drug companies would not just deny victims compensation for the harm they experience. It would also relieve drug companies of their responsibility to make products as safe as possible, and especially to correct drug problems when they are most often discovered – years after their drugs are on the market.

Permitting bureaucrats who are under pressure from their bosses and the drug companies themselves to yank our access to the courts is incomprehensible. We have all heard about understaffing and backlogs at the FDA, and about drug-safety scrutiny that is patchy at best. If the Supreme Court rules in favor of the drug companies, it will eliminate one of the most effective deterrents to letting the bottom line win out over public health and safety

MIDNIGHT SHIFT NUGGET



SLEEPING WHEN IT IS BLISTERING HOT

Many parts of the world are experiencing heat waves, and for the first time many people are having trouble sleeping because it is just too hot.

Research has shown that there seems to be an ideal temperature for sleep and when this temperature is very high, it takes longer to fall asleep, and once sleep is achieved, it is broken up or fragmented and there is less dreaming.

In many parts of the world where it is always hot in the summer, people will often have air conditioning in their dwellings. However, with extreme heat waves, electrical power often goes down because of increased demand.

Here are some helpful tips.

What you can do about where you sleep

1. Do whatever you can to prevent excessive heat build-up in your dwelling. During the daytime use blinds to keep out sunlight and keep the windows closed if the temperature outside is much hotter than inside. At night time, if the temperature is less outside than inside, open your windows.

2. Remember that heat rises. So if you are living in a multiple story dwelling the lower you are the cooler it will be.

3. If there is absolutely nothing you can do to cool off your dwelling, consider asking friends or relations who have a cooler dwelling or who live in a cooler place, whether you can stay with them for a few nights. They will understand.

4. If worse comes to worst, in some parts of the world people end up sleeping outdoors because it is simply not possible to cool off their dwellings at night. If you sleep outdoors, consider the need to protect yourself against mosquitos and other insects.

5. Some communities may have cooling centers in schools or public places that are air-conditioned.

6. This is important! Some people will sleep in a motor vehicle and have the air conditioning running. This can be very dangerous if the vehicle is not moving, because there may be a build-up of carbon monoxide.

What you can do before going to bed

1. Water is a great cooling agent. Showers and baths before bed may help. Strangely enough, some people do better taking hot showers and hot baths when the room temperature is very high. The problem of course with hot showers is that they increase the humidity, which could make things worse.

2. Some people have found that being sprayed by a plant mister or gadget that creates a fine mist may help.

What you can do to improve your sleep environment

1. Light bedclothes and light pajamas or no pajamas are certainly an important option. There are pajamas made from materials that wick away sweat which might be very helpful. Such nightclothes are available and helpful, for example, in women who are having hot flashes during sleep, who sweat a great deal. Such materials include CoolMax ®.

2. Some people find that a fan in the room may help.

If you wake up and you are sweaty and your sheets and pillow cases are wet consider taking a brief shower and change the bed clothes.

What you can do to prepare for future heat waves

1. Since it is getting hotter and hotter, it might be time to invest in some air conditioning units. In many places, room air conditioners are reasonably priced. They are usually hard to find during a heat wave.

2. If you are going to purchase one, make sure that you obtain the right size. For a small room you don't need a huge air conditioner. Ask the vendor how to calculate what size air conditioner you need. Remember that if you use a room air conditioner it is best to seal the room from the remainder of the house. Offer to share your air conditioned place with others.

Protect your health

Remember that when you sweat a great deal, you lose both water and electrolytes. This can be dangerous. Make sure that you replenish both and do not become dehydrated. Avoid excessive and unprotected sun exposure. Sunburn will add to your misery in trying to sleep when it is hot.

Other experts recommend:

Joyce Walsleben, PhD, Sleep Medicine Associates of New York City

*** Sleep often, as long as possible in your usual night schedule and then during the early afternoon if you can get the time**

*** Drink lots of cool fluids and eat smaller, more frequent meals**

*** Freeze a damp washcloth -- this can be used as a nice, cool compress**

*** Try showering and leaving your hair wet or put a cold pack on your head before bedtime**

*** If you are using fans in your home, be sure there is a path for air to flow by keeping the bedroom door open**

*** Play relaxing music -- it can be soothing even on a hot night**

*** Postpone outdoor activities if they are too active**

NSF Alert Readers Recommend:

*** Place a pan of ice cubes in front of a fan to cool down the air being blown around the room**

*** If you don't have a washcloth or ice pack, try using something from your freezer like frozen veggies to cool down your neck, head and shoulders**

HURRICANE RECOVERY AND CLEAN-UP

10 Hazards to Watch For

A hurricane's dangers don't subside with its winds. After the storm, emergency crews put themselves in harm's way to help others. These emergency crews include law enforcement, emergency medical assistance, debris clearing workers, power line repairers and others doing restoration work.

This is dangerous work. According to OSHA, these are just some of the hazards faced by workers involved in hurricane clean-up and recovery:

1. **Hazardous driving conditions due to slippery roadways;**
2. **Slips and falls due to slippery walkways;**
3. **Falling and flying objects, such as tree limbs and utility poles;**
4. **Electrical hazards from downed power lines or downed objects in contact with power lines;**
5. **Falls from heights;**
6. **Burns from fires caused by energized line contact or equipment failure;**
7. **Exhaustion from working extended shifts;**
8. **Contaminated waters;**
9. **Rodents; and**
10. **Dehydration.**

OSHA has published free materials to help employers and workers deal with the health and safety hazards of hurricane clean-up and recovery, including

- **45 Fact Sheets;**
- **27 "Quick Cards";**

All materials can be downloaded from the OSHA web site, www.osha.gov/OshDoc/hurricaneRecovery.html.

Picture This!

CONTROL STRESS TO WORK SAFELY

Have you ever found yourself under too much pressure? You know, those days when you have to stop in the middle of doing something because you're so frazzled you've lost track? Well stress is a natural part of life and work, but if it builds up that's not good. Stress can distract a person, causing them to make dangerous mistakes.