Environmental hazards essay sample

Environment

Abstract

This report is hardly exhaustive, yet it does cover some of the daily elements of environmental hazards. The surprising element of this report is the lack of general knowledge of these hazards by the general public. I have covered five areas that can be seen as common place events. The information contained herein is intended for the inquisitive mind concerning the hazards found in the workplace, accident preventative measures in industry, urban lifestyle hazards, and natural phenomena for which the general public is unprepared. I conclude with the nuclear industry and its relation to mutated bacterial virus.

Natural Hazards

Hurricanes have made the news in the past few years, especially in America, with the most devastating being Katrina that leveled Louisiana’s southern coastline. The devastation repercussions are still being felt even though it has been nearly two years since it struck New Orleans. In 2006 there were twenty-one names reserved for hurricanes from the Atlantic Ocean and twenty-four names for storms from the Eastern North Pacific Ocean. Of these names nine were used for storms from the Atlantic, but eighteen of twenty four names were used for storms from the North Pacific (2006 Hurricane Season, 2007). Two of these were category five hurricanes, but the force behind these storms were in no way comparable to Katrina.

Erin, a hurricane in 1995 caused minimal damage to residents, but according to the case study done on Erin is a good example of how quickly a tropical storm can develop into a hurricane (Hurricane Erin, March 12, 1998). No one

died in this storm, but the case study showed that six people lost their lives due to the effects of Erin on inland waters. This clearly shows some of the elements that cause storms to become hurricanes.

Causation

Hurricanes begin their developmental stages in the tropic. Atlantic hurricanes are birthed from thunderstorms around Africa's west coast. Winds from the equator mix with warm water conditions to create the instability needed for a potential hurricane. About. com gives the following information concerning this mixture of warm water and winds from the equator:

Converging winds near the surface of the water collide, pushing more water vapor upward, increasing the circulation of warm air, and accelerating the speed of the wind. At the same time, strong winds blowing steadily at higher altitudes pull the rising warm air away from the storm's center and send it swirling into the hurricane's classic cyclone pattern (What Causes Hurricanes, 2007).

The devastation left in the path of a hurricane was never for explicit to America until Katrina. The environmental issues ranged from the destruction of roadways which hindered would-be rescuers from reaching the stranded people still in New Orleans after Katrina. To add to the problem of rescue, the water that rose in the city due to rain and oceanic surges was mixed with the city's sewer water to create bacteria that endangered everyone who either got stranded or chose to stay behind. Even after warnings were given, people still had to wade through the water to retrieve what was needed for their rescue.

This, of course led to health issues. Not only was there the threat of health issues due to wading through the bacteria-infested water, there was also the issue of safe food and drinking water.

It is extremely important, in the immediate aftermath of a hurricane and also when cleanup begins, to do whatever is possible to protect your and your family's health. Be certain about food and drinking water safety and availability. Use appropriate protections during cleanup of flooded or contaminated areas (Health Issues, April 26, 2007).

Mitigation concerning hurricanes in general is hard to pinpoint due to the different levels of devastation left behind. In April, 2006 FEMA authorized Mitigation Assessment Team (MAT) to "…assess the performance of buildings. Based on the observed damage, the MAT also evaluated the adequacy of current building codes and provided suggestions to update the codes" (FEMA, 2006). This team produced an eighty page report that included all aspects of devastation and the rebuilding needs. In the executive summary these items were listed:

* Katrina significantly exceeded the base flood elevations (BFEs) by as much as 15 feet along parts of the Louisiana and Mississippi Gulf Coast. Flooding extended well beyond the inland limits of the Special Flood Hazard Area (SFHA), and the highest storm surge in U. S. history was recorded on the Mississippi coast.

* The American Red Cross estimated that Katrina destroyed over 300, 000 single-family homes throughout Louisiana and Mississippi.

* Coastal flood impacts covered a wide area, with severe flood damage extending along coastal Alabama and totally destroying over 100 houses on Dauphin Island.

* Levee failures led to severe flood damage throughout the City of New Orleans and surrounding areas of Plaquemines and St. Bernard Parishes. Hundreds of thousands of people are now displaced due to damage caused by the flooding.

* Katrina’s wind speeds were estimated to be at the design level in only a few areas and were less than the current code-specified speeds (per the 2000/2003 International Building Code [IBC] and the International Residential Code [IRC]) in most areas. These codes use a design wind speed map developed for the 1998 edition of the American Society of Civil Engineers (ASCE) 7, *Minimum Design Loads for Buildings and Other Structures* design standard.

* Wind damage to both commercial and residential buildings was widespread throughout the southern portions of Louisiana and Mississippi.

* In general, buildings functioning as critical and essential facilities did not perform well, and experienced significant wind and flood damage (with damages similar in nature to their commercial counterparts). The operation of many critical and essential facilities was hampered or eliminated as a result of storm-induced damage or isolation due to coastal flooding (FEMA, 548).

Managing the after-care of New Orleans and other areas devastated by Katrina was an enormous undertaking at best. That there was confusion should not have taken America by surprise, yet many criticized the efforts undertaken by various governmental departments. The management included items ranging from temporary housing and redevelopment of land and businesses to building barriers and levees to help minimize the reoccurrence of devastation in the event of another hurricane.

The creation of Katrina Recovery Maps by FEMA aided in the rebuilding of homes and lives in the designated areas affected by flood waters. The purpose of the map was to inform citizens of potential flooding areas to build their new homes by the specifications allowed in the map. This called for amending current policy governing the sea level base of houses pre-Katrina. This was done in an effort to minimize destruction in the event of a flood (FEMA, 548).

Hurricanes are natural phenomena that will occur as long as there is warm water and the right combination of winds. Though there are hazards connected to this phenomenon there are few things a community can do to escape the hazards. Because of the unpredictability of the storms, the best people can do is provide places of protection that will harbor them in the event of another devastating storm. The early warning systems are the first of many inventions used to help reduce the hazards of such events. Managing them can only include measures intended to help people escape the path of one of the most devastating causes of natural hazards.

Hazards in the Workplace and Home

Styrene

Styrene is used in the production of polystyrene plastics, fiberglass-reinforced plastics, synthetic rubber, resins, styrenated polyesters, and protective coatings. These are widely used in everyday life. Just as there are dangers in other refining processes such as with gas and oil, processing styrene also has dangers. Styrene is a colorless, oily liquid. Most, but not all, people can smell styrene at levels below those which cause significant health effects. Its odor is sweet at very low concentrations, but becomes sharp and disagreeable at higher concentrations which still may be well below the legal limits for exposure (Hazard Evaluation, n. d.).

A petroleum refining plant in Texas City, TX has taken the initiative to recycle styrene condensate materials.

In case study #109 the facility has reduced its volume of hazardous waste. A variety of projects contributed to this reduction, including reclaiming spent aluminum chloride and alternatively handling the thousands of tons per year of corrosive wastewaters. This plant provides the chemical company’s other facilities with the opportunity to recycle certain styrene-bearing streams as input materials to styrene production unit. Working within the styrene specifications from Texas City, other Amoco facilities are avoiding incineration costs by recycling styrene condensate materials (Amoco Reduces Amount).

Their heroic efforts of removing the hazard of styrene reduced the hazardous waste by nearly 38, 000 tons over a four year period. The case study also showed a significant reduction of hazardous waste in a variety of other

projects not involving styrene. The danger concerning styrene is still there, but with plants like the one in Texas City, TX doing their part the risks can be lowered to tolerable astandards.

Constant skin contact or breathing styrene vapors can have ill affects in humans. Normally, when exposed to it long enough, symptoms produced are light-headedness, nausea, vomiting, loss of balance, tiredness, etc. Once introduced to the body, styrene can breakdown into metabolites which are simply a byproduct of metabolism. In this case, the metabolite is in the form of styrene oxide which causes cancer and chromosome damage in laboratory animals. The Occupational Safety and Health Association (OSHA) gives the following information about styrene:

Styrene is classified as a possible human carcinogen by the Environmental Protection Agency (EPA) and by the International Agency for Research on Cancer (IARC). Styrene is primarily a synthetic chemical that is used extensively in the manufacture of plastics, rubber, and resins. About 90, 000 workers, including those who make boats, tubs, and showers, are potentially exposed to styrene. It is also known as vinylbenzene, ethenylbenzene, cinnamene, or phenylethylene (Safety & Health Topics, n. d.).

Styrene can be life threatening if acute symptoms are not known by those who work with it when producing bath tubs, boats, and other every day use items. INCHEM, an international program of chemical safety, offers enough information about styrene and its possible health hazards to help be prepared in the case of over exposure. Target organs include the eye, liver, respiratory tract, central nervous system and the skin. Irritation occurs on

the skin which warns that contamination has gone beyond tolerable parameters. INCHEM also states:

Irritation of skin and mucous membranes: eye and nasal irritation occurred after exposure to 300 ppm of styrene. Skin contact resulted in acute and chronic dermatitis. After inhalation of large doses patients experienced chest burning, wheezing, dyspnea, increased nasal secretion, metallic taste, and vertigo. Headache, nausea, incoordination, muscular weakness, anorexia, depression, feeling of drunkenness result from CNS action. The clinical picture is also called “ styrene sickness” (2. 2).

An article published on the Internet in May of 2003 sited contaminated water in Spain and reported having residents of a neighborhood in north-east Spain all reporting symptoms of exposure.

On December 10, 1999, residents of a neighborhood at Castellón, NE Spain informed the local authorities that drinking tap water had a strong solvent-type smell and produced nausea and various other health symptoms when consumed. Drinking water was pumped to the apartments from a tank adjacent to a fire-protection water tank that was repaired and waterproofed some hours earlier (Figure 1).

The reparation involved the application of Aropal FS1933, an unsaturated polyester resin based on styrene, and of fiberglass mats. The possibility of a contamination was suggested due to a communication in the air environment of the two tanks. In addition, to facilitate drying, a fan was used which forced vapors from the repaired tank to the drinking water tank. The odor was perceived on the same day of the reparation work, first at the the

water tanks, the parking place and later in other parts of the buildings. Residents reported that a thin gelatinous layer could be seen on the water in the tank (waste management, March 26 th 1993).

This was a rare occasion indeed, yet if not for the fore knowledge of the symptoms the possibility of permanent physical and nervous system damage from exposure was high. With the correct preventative measures in place, styrene can be produced and used in a safe manner.

Mitigation concerning styrene has lead to changes in its use. One of the more prevalent was when McDonald’s changed their packaging method from polystyrene to paper-based (25). Institutional buying power is the real leader in the safe working practices in industry. On an individual basis, though, education regarding safety issues concerning styrene is on a personal level of commitment to gathering the information needed.

James Koizumi, an air quality specialist, developed a report which he gave to the South Coast Quality Management District Governing Board. In this report he makes several important claims in an effort to mitigate successfully the use of styrene in any usable product.

In Los Angeles County styrene emissions from plants into the air had an adverse affect on its quality. In that report Koizumi states that styrene is considered both an acute and chronic non-carcinogenic compound. This enabled him to collaborate with the California Environmental Protection Agency and also with the Office of Environmental Health Hazard Assessment

to develop health-conservative estimates of the levels of exposure at or below which ill health affects are not expected.

Management of the hazard of styrene is easy enough if known precautions are followed. Protective clothing and breathing apparatus' are a couple of the preventative measures one can take. However, if these measures are not taken and sickness does occur in employees, companies can look for litigation in spite of their mitigation. Overall, though, the general public is not in danger of exposure even in areas like Los Angeles where air quality is controlled and styrene use is monitored.

John Schweitzer, American Composites Manufacturers Association (ACMA) Senior Director of Government Affairs says this about the risk management of products like styrene:

When we use hazardous chemicals in our plants, we become *risk managers* : we balance the risks and costs against the benefits of using the chemicals. If the risks and costs inherent in our operations are outweighed by the benefits – providing income for our families and employment for our workers, and making useful products – then we can properly decide to proceed with the activity.

The costs that we balance against benefits may include investments in equipment, materials, and training programs to reduce the probability of adverse effects (reduce the risks). We should also include consideration of the cost of insurance and the cost of law suits that may occur, regardless of actual risk or adverse effect, whenever businesses engage in hazardous activities (On Styrene, May 2002).

In this report he uses a study done by Harvard University which states there is no danger of cancer to humans who are exposed to styrene. Having established a safe level of parts per million exposure, enables safety factors in the development of products made with styrene. From the above report the overall management conclusion that " All styrene using facilities should fully comply with the voluntary 50 ppm (parts per million) occupational exposure limit for styrene, and operators of plants that resemble the hypothetical worst case community exposure scenario should conduct site specific modeling and reduce emissions or exposures if needed" is both viable and logical.

Urban Hazards

The above text can be applied to urban hazards as well as the specific issues covered in this paper. However, there are various aspects of urban living that can be viewed as a hazard not only to the urban community as a whole, but also to individuals living in these urban communities. The idea of urban hazards has become uncomfortably real in the past few years. With news broadcasts and reports on earthquakes, accidental chemical spills, etc. the affect on life in the urban setting can be noticed. While natural and work related hazards can play a factor in the lifestyle of urban dwellers, utility outages are the most common.

Utilities such as water, electricity and natural gas are life-sustaining essentials in urban communities.

On Aug. 14-15, 2003, a widespread power outage gripped eight states from Michigan to New York and southern Ontario, Canada, leaving more than 50

million people in the dark for as many as 29 hours. In New York City, where losses from interruption to productivity and spoiled goods topped $1 billion, subway service ground to a halt, traffic snarled, workers spilled onto the streets, and commuters crowded City bridges in the initial hours of the outage (NYC Hazards, 2007).

New York City has experienced this twice before. In the same report just cited in 1965 and 1977 utility outages caused over $300 million in loss or damage of properties. In July of 1999 an outage in Northern Manhattan caused 200, 000 customers to be without air conditioning during a particularly hot summer for nearly 19 hours. Subway systems, being a vital part of the urban lifestyle, and a regular means of transportation to work and to other places of business was interrupted for seven hours once due to an explosion of an electrical transformer that resulted in a plant fire.

Wildfires are also hazards that some urban dwellers face. The American Planning Association conducted several case studies concerning the possibility of wildfires and the effect they could have on urban communities. As a direct result of one such study, Flagstaff Fire Department developed hazard mitigation operational guidelines in an effort to be prepared in the case of a wildfire. The subject that rings true in the ears of the population in the Flagstaff area was the bad management of natural fuel accumulations. Without proper management in the pine forests, a wildfire is inevitable.

Wildfire is a natural event within the southwestern ponderosa pine forest. Its very occurrence is a necessary ingredient to a healthy ecosystem. However, due to past management practices, natural fuel accumulations

have been increasing for decades, resulting in an escalating trend in dangerous and destructive wildfires (Best Management Practices, 7).

Wildfires have taken an upward trend and those living in urban areas are at risk. One of the problems the case study addressed was that of making the population aware of this risk. “ Those who live in-and-near our forests, and who believe they are not at risk, are wrong (2). In the operational guidelines manual there is a very defined goal which includes reducing the threat of fires and protecting the urban dwellers around the forests, and secondary goals that include how to manage insects, diseases and drought.

Urban dwellers are always at risk of these hazards simply by their dependence on the various advantages to that lifestyle. For example, in an urban area where the quickest travel route is by subway, few people bother with owning a vehicle. If they do, then they face another potential hazard caused by traffic congestion. Utilities in urban areas cover more than just heating and cooling or transportation.

Another utility that may not be thought of as such is traffic lights. They provide a service, especially to the urban dweller, that cannot be done as efficiently without them. In the event of traffic light failure hazards can range from minor accidents to life threatening pedestrian accidents.

To illustrate how some urban communities can prepare for the unfortunate experience of utility failure or disruption is found in King County in Washington.

Hazard-specific Preparedness Steps

1. Install surge protectors and/or battery back-up systems for computers.
2. If you have an electric garage door opener, find out where the manual release lever is located and learn how to operate it.
3. If you have a telephone system that relies on electricity to work, plan for alternate communication (i. e. standard telephone handset or cell phone).
4. Make sure you have plenty of flashlights and extra batteries available.
5. Consider purchasing a generator. If you have a generator be sure to strictly adhere to safety requirements.
6. Register life-sustaining and medical equipment with your utility company.
7. See General Preparedness Steps below for more disaster planning basics.

Response Steps

1. Use battery-operated light source, such as a flashlights or light sticks during a power outage. Due to the extreme risk of fire, DO NOT use candles during a power outage.
2. Neveruse gas ovens, gas ranges, barbecues or propane heaters for indoor heating. Doing so can lead to carbon monoxide poisoning. These can also increase the risk of fire.
3. Limit the number of times you open the refrigerator and freezer to help keep foods cold for longer.

4. Turn off as many lights and other electrical items as possible (except for the refrigerator and freezer); this will help to eliminate potential fire hazards and lessen the power draw when service is restored.
5. Unplug computers and other sensitive equipment to protect them from power surges when service is restored.
6. Listen to your portable weather radio, radio, or television for current information.
7. If driving, proceed with caution and be alert to traffic lights that are not working. If a traffic light is out, remember to treat it as an all-way stop.
8. Stay away from downed power lines and sagging trees with broken limbs.

General Preparedness Steps

1. Have and practice a family disaster plan.
2. Establish meeting places and phone numbers in case family members are separated.
3. Identify an out-of-state contact to call during a major disaster or emergency; it will be easier to call out of the area if local lines are tied up.
4. Make sure everyone knows when and how to call 9-1-1.
5. Keep your disaster supply kits up to date. Make sure you have kits for your home, vehicle, work and school.
6. Get a tone-alert NOAA Weather Radio to receive emergency notifications and up-to-date information and instructions.

7. Teach all family members when, where and how to turn off utilities. Make sure you have the appropriate equipment, such as a wrench, handy.
8. Make sure you understand the emergency plans and expectations at your child's school and your work.
9. Preplan alternate transportation routes to and from work and other important destinations.
10. Be sure to keep at least a half-tank of gas in your vehicle at all times; power outages often accompany disasters and gas stations rely on electricity to power their pumps.
11. Know ahead of time what you should do to help family, friends or neighbors who are elderly or have special needs (Utility Outages).

Mitigation can be minimal if urban dwellers would follow guidelines such as the ones King County has in place. Utility outages do not have to be a hazard, but many of them are for reasons we cannot control and also for those we can. Looting is something that is possible in any urban setting in the event of a power outage. In such cases mitigation would be needed to help recover losses due to the hazards produced by the loss of a utility.

Oil and Gas Industry Hazards

Given the nature of this industry and the products it makes, it should be clear for us to understand at least some of the hazards connected. Establishing a general preventative measure to protect from potential hazards of the oil and gas industry include awareness of the product when you are in its presence. Gasoline can become deadly if not stored properly.

Oil becomes a hazard to wildlife when it is not disposed of properly. Either of these two very useful products can bring hazard to human life as well.

By allowing it to seep into the earth, especially around drinking water storage areas can be lethal. Of course, it would take quite a large quantity of it to be lethal, but it doesn’t take as much as one would think to make a person ill. I am wondering also, if we can’t include the hazard of bodily injury due to the current outrageous cost of these most vital of necessities. One gas that comes from this industry that seems to be the greatest hazard is Hydrogen Sulfide Gas.

This is used in the production of pulp and paper products, but more interesting is that it is also a byproduct of industry. Potential large emitters of hydrogen sulfide are electric power plants (burning coal or fuel oil containing sulfur), oil and gas extraction operations, oil refineries, pulp and paper mills, sewage treatment plants, large pig farms and other confined animal feeding operations, Portland cement kilns, municipal waste landfills, coke ovens, sulfur products and hydrogen sulfide production, asphalt production and storage and geothermal power plants. Most hydrogen sulfide releases are to the air (Hydrogen Sulfide Fact Sheet, January 13, 2006).

Hydrogen Sulfide can also be found naturally in gas produced by a volcano, coal pits, and even in the decay of sulfur-rich organic matter. If the public educates itself they should be safe. However, if living in an urban, city or even a country setting where a plant is near enough for you to breathe the emissions, it is wise to know all the information available about this gas.

When this gas is produced naturally, e. g. organic decay, it can be detected by its rotten-egg odor. Surprisingly it can also be detected in a very small amount (0. 5 parts per billion). The best information available on the toxicity to humans has been gathered from accidental exposure.

Most of the information on human health effects from hydrogen sulfide exposure comes from accidental and industrial exposures to high levels. Exposure to high levels can cause muscle cramps, low blood pressure, slow respiration and loss of consciousness. Short-term exposure to moderate amounts of hydrogen sulfide in the workplace produces eye, nose and throat irritation, nausea, dizziness, breathing difficulties, headaches and loss of appetite and sleep. Continued exposure can irritate the respiratory passages and can lead to a buildup of fluid in the lungs (Hydrogen Sulfide, October 2005).

The same source did a case study concerning the adverse effects on humans who are exposed to more than 0. 5 ppb (parts per billion). An excerpt taken from that case study follows:

Foul odors and health effects were investigated in an Indiana community near a waste disposal lagoon and in five New York State communities near landfills containing construction and demolition debris. Hydrogen sulfide levels in the Indiana community ranged up to 300 ppb during a two-month period. Levels in two of the New York communities ranged up to 4000 ppb for periods of several months. During these episodes there were frequent health complaints including eye, throat and lung irritation, nausea, headache, nasal blockage, sleeping difficulties, weight loss, chest pain, and asthma attacks.

Although other chemicals may have been present in the air, these effects are consistent with those of hydrogen sulfide.

Siemens Corporation did a case study in the county of Manatee in Florida due to many reports of foul odors the source of which could not be located. As a result of the study, Siemens out sourced the odor control operations due the nature of the complaints and the fact they were seasonal. The corporation offered the services of their odor control processes to the company that won the contract.

This unique approach to odor control works for Manatee County. By contracting with a single vendor offering multiple odor control options, the County gets the benefit of the a dozen different technologies—the most technically and economically advantage solution in each case. Furthermore, the County has a single entity to call to address any odor issue. Records indicate that " new problems" are typically resolved in less than two weeks, and problems at existing sites are resolved within 24 hours (Results).

As a direct result of their solution, mitigation for future infestations of the naturally produced gas is now controlled readily and easily.

Mitigation in California was created to reduce the risk factor of exposure to Hydrogen Sulfide in several school zones. During research in this area it was discovered that a future site for a baseball field had heavy concentrations of the gas only thirty-three feet below the proposed field (School Property Evaluation, n. d.). With the given amount of productivity in California, it is only right that they have a strict code governing the production of any

emissions. Again, though, the consumer is only going to be as safe as the regulations will allow, but personal education can lead to further safety.

The Environmental Protection Agency (EPA) has a lot of information which the general public can find at www. epa. gov and entering a search for Hydrogen Sulfide. The EPA studied components concerning both oral and inhalation exposure. It was quickly ascertained that oral exposure was not probable so the focus then centered on the inhalation of the gas. Other studies, e. g. long-term and constant exposure could not be made due to the lack of subject matter.

The toxic reviews from the EPA provided the following data:

HAZARD IDENTIFICATION

Hydrogen sulfide is a colorless gas and has a strong odor of rotten eggs. Its primary uses include the production of elemental sulfur and sulfuric acid, the manufacture of heavy water and other chemicals, in metallurgy, and as an analytical reagent. Although quantitative data are lacking, toxicity studies suggest that H_2S gas is absorbed rapidly through the lungs. Oral exposure is not likely to occur. In animals and humans, it distributes to the blood, brain, lung, heart, liver, spleen, and kidney. Oxidation is the primary metabolic pathway for H_2S, with thiosulfate and sulfate as metabolites. Metabolism in laboratory animals and in humans appears to be similar. Hydrogen sulfide is excreted in the urine.

Human data pertaining to inhalation exposure (the expected route of ambient exposure) consist of a plethora of case reports and a variety of

occupational epidemiological studies. Although these studies have limitations that preclude their use for quantitative risk assessment, they indicate that exposure to H_2S (at high concentrations) has profound effects on the respiratory system leading to unconsciousness with attendant neurologic sequelae and, sometimes, death. An increase in cardiovascular-related deaths due, in part, to H_2S exposure was reported in one occupational study (Hazard Identification, June 2003).

The report is quite frightening given that the use of the gas is profitable for life in America. Knowing what to do in the event of exposure is the best preventative measure one could take. When the use of the gas was made public in North Carolina, a group of citizens put together The North Carolina Action Network. They knew the potential hazard to the population in North Carolina and were concerned enough to create a form letter that the populace could use to advise their governmental officials of the concern they had for the potential hazard.

One excerpt from the letter urged the Environmental Management Commission to put in place some strong standards concerning the use of the gas. The letter contains exposure limitations as well as other information concerning agencies determined to develop some measure of protection (Protect Human Health, December 4, 2003).

Mutated Bacteria and Viruses

One of the best case studies concerning mutated bacteria conveys information about the Black Death virus of the 1300’s.

By 1351, when the plague was moving in that direction, along the rivers and through the Baltic, the epidemic was two and a half years old. By then, it is possible that the plague bacteria had mutated into a less virulent form (TED Case Studies, n. d.).

This is a good example of the connection between bacteria and viruses. The study goes on to say that the Black Death was one of the greatest ecological disasters that threatened mankind. One reason it traveled so far has to do with trade routes. Of course, we like to think that we are invincible, but when the Black Death hit Europe in Medieval times, mankind was given a wake up call.

Today, being faced with epidemic cases of bird flu and the possibility of it being transmitted to humans gives all the more reason the study of the Black Death is important. This case study, widely used in the medical profession, still gives pertinent information about causation of outbreaks in viruses or bacteria and also helps them in developing medicines to fight virus outbreaks we face today.

Now we face HIV which can be transmitted in a number of ways. This transmission can eventually take more lives, in the long run, that even Black Death did. However, because we are so technologically advanced we have even more arrogance in the face of mutating bacteria and viruses. But, this comes to mankind in many forms.

Another hazard that humans face now, but have not always had to face, is the radioactivity from nuclear power plants. The increased danger of this hazard is not recognized until it is too late to do anything to prevent it. Sara

Shannon, in 1998, provided some excellent documentation on the effects radiation exposure has had on humans since 1975. She claims that many of the diseases we now face can be traced back to the inception of nuclear power. The production of the power was hitting urban life and radioactivity was beginning to mutate viruses and bacteria. The only problem with this was nobody knew it was happening. Shannon shares:

It is well known that radiation can cause mutations in bacteria and viruses. Andrei Sakharov, the famous Russian physicist, described in his 1992 *Memoirs* that even at low levels radiation could increase mutations of bacteria and viruses. His predictions which were originally made in 1958, have come true and we are seeing new ailments such as Reyes Syndrome which first appeared in 1963, and Legionnaire's Disease which is cased by a bacteria that was not threatening prior to 1976.

AIDS may be related to a mutated virus combined with a weakened immunity in a generation born after the first nuclear weapons were detonated. Of particular interest is Lyme Disease which first appeared in 1975 near the Millstone and Haddam Neck nuclear power plants in Connecticut. Dr. Jay Gould in *Deadly Deceit* (1990, Four Walls Eight Windows) describes: " In 1975 there were 59 cases of Lyme Disease recorded; in 1985 the number increased to 863, mainly in the two counties of Middlesex and New London, CT near the Millstone Nuclear Power Plant. Just as increases in cancer may be linked to the huge radiation release from Millstone in 1975, so too may be the tick-borne Lyme Disease epidemic.

The Lyme Disease is carried by a spirochete that had not been as harmful to humans prior to 1975. It is well known that radiation can cause mutations in bacteria. The enormous 1975 Millstone radiation release may have caused just such a mutation in the tick-borne spirochete.” So we have a double challenge — the weaker immune system, and the new diseases resulting from mutated pathogens (Hazards, 1998).

The use, or misuse, of nuclear material, even in the production of electrical power, has exposed so many to radiation that many diseases we now face are speculated to have begun in 1975 in Connecticut. She alludes to the AIDS virus having its incubation during this time period causing immune system breakdowns that eventually lead to the virus; whether or not this is nothing more than hyperbole cannot be ascertained; however, it is an interested claim and worth some investigation.

For the purpose of this paper, though, I will focus on how this mutation is affecting the human race and what, if any, preventative and management measures can be taken. Another view of this potential hazard comes from Shockzine. com in the form of a blog.

As fear of nuclear apocalypse abated, AIDS threatened another kind of apocalypse — a biological one. While the mysterious AIDS plague spread world-wide, ghastly new microbial horrors came to light. Richard Preston’s non-fiction The Hot Zone (1994) raised bone-chilling fears of bizarre, highly contagious new viruses like Ebola, Marburg, and Lassa. Focusing on the microbe’s insidious and deadly power, Preston elaborated gruesome descriptions of virus-induced human body meltdowns. “ From the point of

view of the virus, we humans are an enormous pile of meat," says Preston. " Viruses don't care about us . . . that we're intelligent. A virus is like Jaws in a test tube" (Virus Culture, n. d.).

While I may not agree with the magazine's view of mutating bacteria and viruses, it does lend one to a study of Chernobyl. Whether there were bacteria affected by the radiation from the power plant or not are for the scientists and biologists to find. The end result of hazards connected to the nuclear industry are probably either not fully known, or are covered up by proponents, usually very wealthy, for the continuation of research to find other uses of nuclear power.

In conclusion to these hazards, I need to state that all of the preventative measures available to help protect people from the different harmful results accompanying these vital parts of everyday life can only be exhausted by perpetual research. In other words, one could never read all the information, especially on the Super Highway, related to these hazards in one life time. While I am at risk every time I get out of bed, I have chosen not to become a slave to that fear.

My point is that even though we face hazards everyday of our life we can still lead productive and full lives. The one hazard that is the most difficult to escape is the hazard of fear. This plays a role in natural hazards, workplace hazards, urban hazards, gas (prices), and nuclear radiated mutating bacterial viruses. I will conclude this paper with a quote that is apropos: " So… let me assert my firm belief that the only thing we have to fear is fear itself—

nameless, unreasoning, unjustified terror which paralyzes needed efforts to convert retreat into advance (Only thing, n. d.)

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