

## Preventing the ‘Second Wave’ of Catastrophe in the Gulf.... Progressive Environmental Illness<sup>1</sup>

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*“The teams drilling the relief wells designed to stop the oil gushing into the Gulf of Mexico have a daunting task — hit a target roughly the size of a salad plate about three miles below the ocean surface. If the workers aboard Transocean Ltd.'s Development Driller II or its sister rig DDIII miss or move too slowly, oil will keep pouring into the sea. No one on the rig has done this before because these deep-sea interventions are so rare.... Once one of the two relief wells intersects the damaged line, BP plans to pump heavy drilling mud in to stop the oil flow and plug the blown-out well with cement.... It's a tricky task and it's not guaranteed to work. A pair of relief wells took months to stop an undersea gusher in Mexico that started in the summer of 1979.” Ray Henry, Associated Press, 6-21-2010*

*“An internal BP document released by a U.S. lawmaker (Congressman Edward Markey, D-MA) estimated that a worst-case scenario rate for the Gulf of Mexico oil spill could be about 100,000 barrels per day, far higher than the current U.S. figure.” Tom Bergen and Ernest Scheyder, Reuters, 6-21-2010.*

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<sup>1</sup> A version of this paper has been published in *The American Trial Lawyer*, [www.TheAmericanTrialLawyer.com](http://www.TheAmericanTrialLawyer.com).

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As the federal government, politicians and oil executives continue to seek a good news patina for the country's most catastrophic environmental disaster in its history, the ongoing bleeding of oil into the Gulf of Mexico portends a frighteningly hideous legacy.

The numbers are staggering. During the first two months of the spill, an estimated 250 million gallons of crude oil contaminated the bed that supplies one-third of the nation's seafood supply. By the time two relief wells which are hoped to stop the gushing of oil are operational, more than a half billion gallons of oil will have been leaked into a coastal environment unlikely to be again pristine during the lifetimes of those able to re-tell the story from first-hand memories. As oil industry engineers burn millions of gallons of crude at the surface to curtail visible encroachment onto gulf breaches, noxious plumes of unknown chemical contaminants that have traveled more than a mile from the ocean floor through fish feeding grounds, reach far up into the atmosphere to be carried by wind currents for deposit hundreds of miles inland as acid rain. Even as BP pledged \$20 billion in escrow to rapidly compensate damage claims, and another \$100 million targeted for lost-wage payments to out-of-work oil workers, the public's recognition that the unknowns in the Gulf oil spill far outweigh the certainties has raised the political and economic stakes to unprecedented levels, with villains far outnumbering heroes. In this high-pressured political-social environment, short-term, immediate impact actions can take dangerous precedence over long-term solutions.

Thus, the 'first wave' of catastrophe has made itself known by water, land and air, with ramifications felt politically, economically and personally across entire states dependent upon the Gulf of Mexico for a large portion of their livelihood.

But, the insidious second wave – the human health consequence already in motion – also holds the potential to be among the nation's worst-ever public health catastrophes unless steps to mitigate are taken now.

### **A 'Perfect Storm' Brewing**

The Gulf of Mexico's plume of oil, mixed with dispersants, stirred by ocean currents, catalyzed by heat, and carried by moisture, combine to form a figurative 'perfect storm' portending dangerous health consequences for people exposed. This potential for human damage applies not only to those working on the cleanup, but to millions of citizens living inland along Gulf Coast states who may erroneously believe they are out of harm's way. The concern is the propagation of insidious environmental illness that begins unnoticed and therefore untreated, but once initiated can progress over a short period of time to serious clinical disease.

The volume of volatile organic contaminants already deposited in the Gulf, including proven cancer-causing polycyclic aromatic hydrocarbons, genotoxic<sup>3</sup> agents and teratogenic<sup>4</sup> conjugates formed in the water-borne plume, is unprecedented in human

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<sup>3</sup> *Capable of causing damage to DNA and other genetic material*

<sup>4</sup> *Capable of causing birth defects in newborn babies*

history. The federal government agencies with oversight authority – the Environmental Protection Agency, the Occupational Safety and Health Administration, and the Public Health Service – have little or no experience measuring and mitigating exposures of this intensity, magnitude and nature. As the government and BP have been guessing in terms of technology capable of stopping or otherwise managing the leak flow, an equal amount of guessing is involved in assessing the human health risks.

A primary challenge is in determining the chemical exposures being sustained by the population presently and in the future. That target is constantly moving. The mixing-in of millions of gallons of dispersants<sup>5</sup> with the full range of organic and inorganic compounds present in crude oil has no historical precedent, and is creating this panoply of new chemicals never before seen in nature.<sup>6</sup> Consider the Gulf of Mexico as a beaker in a chemistry laboratory. Crude oil contains an estimated sixty-five different chemical species dumped into the beaker.<sup>7</sup> Dispersants provide another dozen unique chemicals at minimum, also dumped into the beaker.<sup>8</sup> The shifting currents and tides of the ocean serve to agitate and mix the chemicals. As the oil slick grows, it absorbs enormous amounts of heat from the sun, raising the temperature of the mixture in the beaker, and thus providing a catalyst for new chemical reactions. Theoretical formulas for unique chemical combinations in a catalyzed environment predict, for example, 120 new combinations where only five unique chemicals are present. Seventy-seven unique chemicals, which represent a conservative estimate of active compounds in the Gulf of Mexico mix, predict more than a billion new carbon chemical possibilities moving through the various pathways of human exposure. At this point in time, it is not possible to know with any degree of certainty the content of the exposure plumes spreading through the water, air, food chain and land. Without knowing the identity of the chemicals, it is not possible to know their toxicities and their potential impact on human health.

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<sup>5</sup> *Many dispersants are of such dangerous toxicity that they are allowed for use only in extreme emergencies.*

<sup>6</sup> *Crude oil is a mixture of hydrocarbon molecules, which are organic compounds of carbon and hydrogen that may include from one to 60 carbon atoms. The properties of hydrocarbons depend on the number and arrangement of the carbon and hydrogen atoms in the molecules. The simplest hydrocarbon molecule is one carbon atom linked with four hydrogen atoms: methane. All other variations of petroleum hydrocarbons evolve from this molecule. Hydrocarbons containing up to four carbon atoms are usually volatile gases, those with 5 to 19 carbon atoms are usually liquids, and those with 20 or more are usually solids.*

<sup>7</sup> *Total Petroleum Hydrocarbons (TPH).* <http://www.atsdr.cdc.gov/ToxPr ofiles/tp1 23.pdf>

<sup>8</sup> *Dispersant chemicals being used in the Gulf as reported by the U.S. Environmental Protection Agency website, June 21, 2010: 1,2-Propanediol, Ethanol, 2-butoxy-Butanedioic acid, 2-sulfo-, 1,4-bis (2-ethylhexyl) ester, sodium salt (1:1), Sorbitan, mono-(9Z)-9-octadecenoate, Sorbitan, mono-(9Z)-9-octadecenoate, poly(oxy-1,2-ethanediyl) derivs., Sorbitan, tri-(9Z)-9-octadecenoate, poly(oxy-1,2-ethanediyl) derives, 2-Propanol, 1-(2-butoxy-1-methylethoxy)-Distillates (petroleum), hydrotreated light.*

Another challenge is that, in testing for the presence of environmental chemicals, it is necessary to know *a priori* what is being sought for measurement. When the contaminant pool is unknown as is the case with the chemical mixtures emanating from the Gulf oil spill, no reliable assurances of accuracy with regard to nature, concentration and intensity of exposures are possible. Note that in their public releases, the Environmental Protection Agency carefully parses the descriptions of what they are reporting.<sup>9</sup> Further, as the problem oil slicks continue to grow, the amounts and intensities of exposures will continue to rise. This is a special problem for those chemical toxins that are small enough to be carried on water vapor. These dangerously contaminated vapors are deposited deeply into the lungs via normal breathing and then dispersed throughout the body.

These plumes of unknown chemicals have already moved into the food and ecological chains. Equally important is the penetration of these chemicals into the meteorological system. These unknown mixtures are volatilizing, rising with the evaporative plumes of moisture that are part of the rain cycle, and being dispersed hundred of miles inland. The inland areas affected include Louisiana, Mississippi, Alabama, Georgia, Florida, the Carolinas and Virginia.<sup>10</sup> The population-at-risk in these states is more than 64 million people. Millions of people also visit these states every year for business and recreation while others across the country ingest gulf seafood. All tolled, nearly 20 percent of the U.S. population could be directly impacted by these mysterious exposures. The most vulnerable subgroups are the very young, the very old and those who are already ill.

The amounts, arrays and dispersion avenues of the chemical contaminants spewing from the Gulf oil leak portend that potentially dangerous populations exposures through air, water, land and the food chain are unavoidable. People exposed are at risk of serious illness. Unfortunate but nonetheless important, is that current assessment of the danger corresponding to these environmental exposures is highly speculative, at best. Reassurances by federal and local government agencies with respect to safety are not science-based and inherently unreliable.

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<sup>9</sup> *The following data reports are from the U.S. Environmental Protection Agency website, June 11, 2010, reflecting sampling data from the Gulf of Mexico. **Note the non-descriptive verbiage underlined.***

*Air Data: EPA has observed odor-causing pollutants associated with oil on the shore in the gulf region at low levels. Some of these chemicals may cause short-lived effects like headache, eye, nose and throat irritation, or nausea.*

*Water Data: Water samples collected June 2, 6, 7, 8, 9, 10, 2010, along the Gulf coast did not reveal elevated levels for chemicals that are usually found in oil.*

*Surface water results collected on May 22 and 23, 2010 at 10 stations along the coast of Louisiana were measured for two of the chemicals associated with dispersants (2-Butoxyethanol and 2-Ethylhexyl Alcohol) but did not detect either one.*

*Sediment samples collected June 8 & 9, 2010 along the Gulf coast did not reveal elevated levels for chemicals that are usually found in oil.*

<sup>10</sup> *The picture of dispersion can be illustrated by the paths of any of the Gulf-based hurricanes or tropical storms of the past decade.*

The good news is that, even with the inevitability of exposure, the ‘second wave’ of catastrophe can be mitigated, if steps are taken now.

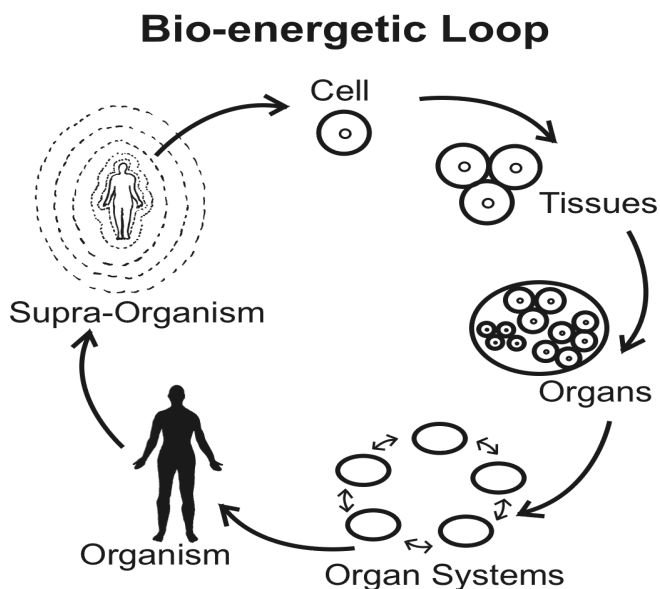
### Preventing the ‘Second Wave’ – Progressive Environmental Illness

The circumstances of the Gulf oil spill make it impossible to accomplish primary prevention or avoidance of exposure. It is a certainty that population exposures will occur. It is unknown what the nature and intensity of those exposures will be. Therefore, secondary prevention aimed at mitigating the effects of exposure is the appropriate public health step. Secondary prevention encompasses intervening at the earliest possible time in the illness process so that the disease progression can be stymied or reversed.

#### Progressive Environmental Illness Is The Concern.

Most environmental illness begins as a series of subtle symptoms which people usually attribute to life’s normal “bumps in the road”. As the responsible exposures are sustained over a period of time, the subtle biological responses progress to self-propagating pathology that can lead to serious clinical disease. This is the overriding concern with exposures emanating from the Gulf oil spill.

The underlying mechanism for progressive environmental illness is well known. The environmental exposure insults from air, water, land and the food supply associated with the Gulf oil spill, will provoke a natural cascade of protective and adaptive responses in all persons exposed, with the ultimate protection aimed at keeping individual cells in the body from being damaged. These responses operate through the Bio-Energetic Loop, which defines the layers of connection between the environment and the functions within the human body.



A first line of defense or the first level of adaptive response involves the senses, which operate at both the Supra-Organism and Organism levels of the Bio-Energetic Loop. The constructive purpose of sensory input is to provoke in the person an avoidance behavior. For example, the strong noxious smells being reported by workers involved in cleaning the spill are warnings that the environment they are in is dangerous.<sup>11</sup> When the person is not able to avoid the exposure, deeper level responses are triggered which increase sympathetic (e.g. 'fight or flight') stress reactions within the body and the cascade of symptoms ensues.

Cell membrane level adaptive responses occur through biological mechanisms involving oxidation, membrane permeability, cellular energy, intercellular communication<sup>12</sup>, tissue integrity and organ system function. While mal-adaptation leads to disease, constructive or healthful adaptation tends toward resistance and sustainability in the person. When the level of response reaches to individual cells, both progressive pathology and long-term resistance can be induced.

The key to protecting those who have been and will be exposed to Gulf oil spill chemicals is intervening in time to decrease the adverse impact of oxidative stressors<sup>13</sup> and to increase the probability of healthful adaptation.<sup>14</sup>

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<sup>11</sup> *If there is no avoidance response following the sensory warning, the organ systems take over – for example, initiating an adrenalin release provoking cardiac and circulatory system changes to facilitate 'fight or flight'. The protective layers scale down to the individual cell, where lipid peroxidase and related reactions effectively close cell membrane ion channels as the last line of defense. The protective cascade is a continuum where each insult impacts the entire Bio-Energetic Loop to varying degrees.*

<sup>12</sup> *Individual cells function in coordination with neighboring cells. The means of effecting this coordination is intercellular communication. Intercellular communication is achieved through at least two distinct types of reactions. The first is an energetic communication that is bio-photon based. The second is biochemically mediated through gap junctions and connexins, depending on the type of cell. Most important is that the combination of light energy and chemical energy transfer makes intercellular communication effectively instantaneous. The Bio-Energetic Loop is thus the immediate connection between cells and the environment*

<sup>13</sup> *Oxidative stress refers to the reaction at the cell membrane, which is responsive to environmental dangers (i.e. sympathetic stress) perceived by the organism.*

<sup>14</sup> *Prevention, treatment and management of Progressive Environmental Illness are most successful when the fundamental Bio-Energetic Loop that underscores the organism-environment interaction is the basis for treatment and management protocols. Energy potential differences across cell membranes have long been known to play important roles in cell structure and function. As biological knowledge has evolved, it has also become clear that virtually all reactions in physiology are the result of energy transfer, including making and breaking of ionic or covalent bonds, free radical reactions, and osmosis. The cell membrane is the focal point for cellular environmental monitoring.*

There Are Stages of Progressive Environmental Illness.

The progressive nature of environmental illness, with symptoms ranging from sub-clinical to clinical, affords the opportunity for identification of those at highest risk early in the disease process so that appropriate interventions can be implemented. Thus, health surveillance which is subtle symptom based is an important tool for achieving effective secondary prevention and protection for those exposed. And, there is no better source of the most important data on health effects than those who are experiencing those health effects themselves. Thus, empowering individuals who are exposed to understand and judge their own degree of adverse effect is a critical public health intervention step.

In Table 1 are symptoms and conditions associated with the stages of progressive environmental illness. These symptom markers are useful indicators for identification of high-risk individuals. Those workers and residents who believe they have been exposed to Gulf oil spill chemicals and who exhibit these symptoms should seek out early intervention protocols as mitigation. When intervention is implemented at the earliest stage of illness, the probability of complete mitigation and elimination of the danger dramatically increases.

**Table 1: Progressive Environmental Illness: Symptoms and Conditions by Stage**

<i>Stage 1</i>	<i>Stage 2</i>	<i>Stage 3</i>
<i>Headaches</i>	<i>Persistent Nausea</i>	<i>Tumors</i>
<i>Dizziness</i>	<i>Persistent heartburn</i>	<i>Cancer</i>
<i>Inability to focus</i>	<i>Joint Pain</i>	<i>Miscarriage</i>
<i>Memory loss</i>	<i>Excessive fatigue</i>	<i>Birth Defects</i>
<i>Unexplained anxiety</i>	<i>Irritable bowels</i>	<i>Diabetes</i>
<i>Sleep problems</i>	<i>Tingling in extremities</i>	<i>Heart Disease</i>
<i>Night sweats</i>	<i>Chemical sensitivity</i>	<i>Depression</i>
<i>Heart palpitations</i>	<i>Electro-sensitivity</i>	<i>Suicide</i>
<i>Ringing in ears</i>	<i>Blurred vision</i>	

Source: Institute for Healthful Adaptation. [www.healthfuladaptation.net](http://www.healthfuladaptation.net)

In Table 2 are laboratory markers that are used to measure progress in mitigating cell membrane oxidative stress following the implementation of intervention protocols. As secondary interventions are tried, it is important to monitor their effectiveness. While symptoms might go away, that is no guarantee that the underlying pathology has been reversed. Therefore, laboratory markers capable of tracking the progression or reversal of the underlying pathology are important parts of the plan.

**Table 2: Laboratory Markers for Oxidative Stress**

<b>Laboratory Marker</b>	<b>Sampling Method</b>	<b>Interpretation</b>
<i>Total Anti-Oxidant Capacity</i>	<i>Blood Sample</i>	<i>Ability of system to scavenge free radicals</i>
<i>Cortisol</i>	<i>Blood Sample or Saliva</i>	<i>Measure of systemic sympathetic stress</i>
<i>DHEA</i>	<i>Blood Sample or Saliva</i>	<i>Sympathetic stress related inflammation</i>
<i>TBARs (3<sup>rd</sup> Derivative)</i>	<i>Blood Sample</i>	<i>Lipid peroxidase reactions indicating amount of cell membrane oxidation</i>

Source: O<sub>2</sub>S Laboratories, Sarasota, Florida. 866-620-4459

### The Way Forward

As daunting as the tasks regarding mitigating the Gulf oil spill are, and as devastating as the impacts have been, there is a clear path forward for individuals who have been harmed, or believe they might be harmed, to avoid the ‘second wave’ of catastrophe. The key is helping people adapt as rapidly as possible so that the long-term effects are minimized.

- *Given that there will be exposures and illness, the best advice for any person who is exhibiting symptoms or is concerned that they have been exposed to a degree that might be dangerous, is to immediately implement personal secondary prevention measures.*
- *Helpful measures include eliminating or reducing all sources of oxidative stress in their living environment<sup>15</sup>, being mindful of proper nutrition, exercising regularly, supplementing diet with antioxidants, and ensuring proper amounts of sleep.*

Certainly, the Gulf oil spill has caused tremendous hardship to many already. Lost jobs and business revenue are in need of urgent redress. However, it is critically important to be mindful of maintaining the long-term health of the population. Although not as visible as oil washing up onto Pensacola Beach, the ‘second wave’ of catastrophe could be equally or even more devastating. It is important to not make mistakes of delay in effectuating those steps that can stop the ‘second wave’ flow.

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<sup>15</sup> Sources of oxidative stress include: cell phones, WiFi and other generators of electromagnetic radiation; solvent based cleaning liquids and soaps; perfumes and fragrances;

## **ADDENDUM**

### **Special Program to Help Those Exposed to Dangerous Chemicals from the Gulf of Mexico Oil Spill**

A special **Gulf Oil Spill Health Risk Management Program** has been launched as a service to those wishing further guidance. This program incorporates the most up-to-date secondary intervention advances to mitigate progressive environmental illness associated with Gulf oil spill exposures as well as anxiety, depression and other associated problems.

Information for those who wish to participate can be gleaned through any of the following:

- [www.healthfuladaptation.com](http://www.healthfuladaptation.com)
- [www.healthfuladaptation.net](http://www.healthfuladaptation.net)
- [www.creatingtoday.net](http://www.creatingtoday.net)
- 866-620-4459

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June 21, 2010*