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BioVigilance, Inc. Food Safety, Pharmaceutical and Environmental Monitoring Licensing Information



**SIRA Technologies** concerns itself with food, environmental and pharmaceutical safety. The central intellectual property applied in these endeavors is our transformativ, Simplified, Inexpensive, Rapid, Accurate barcode matrix (Food Package Sentinel System™: FPSS). FPSS configurations monitor, globally track, interdict and report contaminated food in storage areas and market cases for atmosphere anomalies.



**BioVigilance™**, a SIRA progeny company, from genesis was organized to create methodologies, protocols and systems to thwart pernicious intent (terrorism in particular) and maintains relationships with the military, federal oversight agencies and with legislative branches, domestic and abroad. Primary among its development is a shipping container security system that monitors temperature, atmospheric anomalies, pernicious vapors and covert human habitation. This system is a wireless, real-time reporting system with global reach.



**Food Safety, Pharmaceutical & Environmental Monitoring:**

SIRA's Award-Winning Technology, the Food Sentinel System™, uses bio-sensing bar codes that "morph" to prevent shipments and sale of dangerous foods, drugs and packages with atmospheric anomalies.



**BioVigilance™**

Global monitoring for tampering and atmospheric anomalies in shipboard and other transport containers including land storage and public use areas.

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Food Safety, Pharmaceutical and Environmental Monitoring

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Food Safety, Monitoring

[Thinking Barcodes](#) • [Time/Temperature Monitoring](#) • [Marine Pathogens, Seafood Illness](#) • [Resources](#)



[Thinking Barcodes](#): Utilizing an enhanced bar code format, the Food Sentinel System™ offers producers and consumers a mechanism to screen products susceptible to spoilage from the time it is packaged until the time it is removed for preparation.

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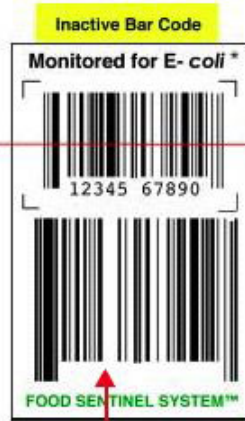
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**FOOD SAFETY — A Universal Imperative  
Performance Profile of:  
The Food Sentinel System™**

**Scanned & Visual Bio-Monitoring for  
Tracking and Reporting Food Safety**

Utilizing an enhanced bar code format, the Food Sentinel System™ offers producers and consumers a mechanism to screen products susceptible to spoilage from the time it is packaged until the time it is removed for preparation. By utilizing germane portions of the purveyor's bar code as a test indicator, bar code readers, at any station in processing, or subsequently, in food markets, will automatically reject any product that reflects a positive reading for potential (time-temperature indicators) or actual (pathogenic) contamination.



Purveyor's Code

Incomplete Code

Complete Performance Profile

**Additional Product Information**



For a .pdf of this page, click here.



For a .pdf with additional information about thinking barcodes, click here.

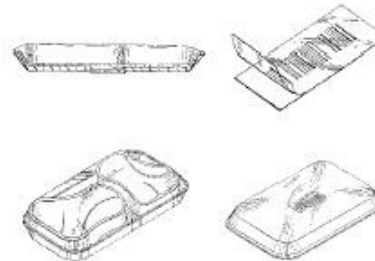


For a Quicktime Animation of the Food Sentinel System, Click here (5mb)



For a Quicktime movie of CNN's Coverage of the Food Sentinel System, Click here (22mb)

**Safe Food**



(One of several available Sentinel formats)

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### Marine Pathogens/Seafood Illnesses

SIRA Technologies, with BioVigilance, Inc. has developed and successfully introduced protocols for monitoring marine ecology and interdicting foodborne illnesses associated with marine harvest and subsequent human consumption.

The protocols, implements and material inherent in them are Simplified, Inexpensive, Rapid and Accurate. In collaboration with academic and governmental institutions, the protocols are reported to have been introduced and utilized in China, The Phillipines, The Dominican Republic, Venezuela and Puerto Rico.

Further, through association with scientists from two particularly celebrated universities, along with biologicals supplied by the Food & Drug Administration (FDA), SIRA Technologies established a substantial link between a widespread environmentally-based ocean toxin, specific fish that ingest it and then, with alarming frequency, become responsible for a crippling disease in humans.

That protocol, and similar ocean/harvest-monitoring scenario remain open for discussion as well as dialogue in regard to custom approaches for response to your specific needs.

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### WHAT IS CIQUATERA POISONING?

Ciguatera poisoning is not a new disease, it was described as early as 600 B.C by the Chinese and in the 18th century was known to have infected the crew of Captain James Cook during a voyage to Tahiti. The head and organs from the same fish that infected Captain Cook's crew were fed to their pigs, causing their death. In a case akin to history repeating itself, in August of 1985, four of Captain Cousteau's camera crew ate barracuda at a hotel in Haiti and six hours later were stricken with ciguatera poisoning. "... they were lucky, they recovered completely in two months." (San Francisco Chronicle, March 1988)

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## WHAT IS CIGUATERA POISONING?

Ciguatera poisoning is not a new disease, it was described as early as 600 B.C by the Chinese and in the 18th century was known to have infected the crew of Captain James Cook during a voyage to Tahiti. The head and organs from the same fish that infected Captain Cook's crew were fed to their pigs, causing their death. In August of 1985, four of Captain Cousteau's camera crew ate barracuda at a hotel in Haiti and six hours later were stricken with ciguatera poisoning. "... they were lucky, they recovered completely in two months." (San Francisco Chronicle, March 1988)

While much more research needs to be done to determine the origin of ciguatoxin, scientists have determined that it is caused by toxins produced by microscopic, single-celled, free-swimming marine organisms, the primary one being *Gambierdiscus toxicus*.

Ciguatoxin is a lipid soluble, heat-resistant, acid-stable toxin. This means that you can not boil, salt, dry, freeze, marinate or cook the fish to eliminate the toxin. The fish look, smell and taste normal. The toxin tends to accumulate more in the head, organs and roe of the fish — it may be 100 times more concentrated in these parts than in the flesh. The freshness of the fish has no bearing on its toxicity.

The medical community is just beginning to understand ciguatoxin and although it is the most common food borne condition due to a chemical toxin, it is not a reportable illness, is vastly under-diagnosed and frequently misdiagnosed as salmonella or a persistent flu. Recent discoveries show that there are 27 different ciguatoxins. Fish are known to carry more than one of these toxins at the same time — one moray eel was found to have 9 different ciguatoxins.

Susceptibility to the toxin and severity of the symptoms varies greatly among individuals which may be due to the presence of several different toxins. Immunity through previous exposures to ciguatoxin does not develop. On the contrary, evidence suggests that individuals who have been previously exposed are more susceptible and react to lower levels of the toxin. Additionally, the severity of the symptoms increases with subsequent ingestions of toxic fish.

*HOW DOES A FISH GET CIGUATOXIN?*

Microscopic organisms called dinoflagellates attach themselves to the surface of marine algae which is eaten by fish that feed on plants. The algae grow on or near coral reefs in tropical and near-tropical regions. The toxin gets passed up the food chain from the small, plant eating fish; to large, carnivorous fish; to larger, predatory fish; and finally to humans.

Ecologic disturbances to the reef cause the toxic organisms, which normally reside under the sand, to swim and spread rapidly. These disturbances to the reef can be either man-made or natural. Underwater earthquakes, typhoons and tidal waves or tsunamis are some of the natural causes for outbreaks of ciguatoxin. Man-made causes include ship wrecks, explosions such as bombs or dynamite fishing and construction (docks and piers or swimming areas) which necessitates disturbing the reef. We know, for instance, that the incidence of ciguatoxin in the South Pacific greatly increased after World War II. Increased nutrients and water salinity have recently been noted as contributing factors.

*WHAT SYMPTOMS COME FROM EATING A TOXIC FISH?*

Ciguatera poisoning exhibits itself in a variety of ways with as many as 150 reported symptoms ranging from gastrointestinal to neurological and cardiovascular disorders. The symptoms last from an initial duration of 14 to 21 days, to months or even years in protracted cases.

The onset of symptoms usually occurs within three to five hours after eating a toxic fish, but severe cases have been known to be more immediate. Consuming the head, organs or roe of the infected fish causes more severe symptoms.

General symptoms include: weakness; diarrhea; muscle pain; joint aches; numbness and tingling around the mouth, hands and feet; reversal of temperature sensation where cold objects feel hot (a burning or tingling sensation may also be felt) and hot objects feel cold; nausea, vomiting, chills, itching, headache, sweating and dizziness. Prolonged cases may also exhibit depression and the development of various phobias. Low blood pressure, reduced blood volume, coma or death occur occasionally, but varies from region to region. These more severe symptoms are thought to be associated with consumption of the head and/or viscera (internal organs) of toxic fish. If you

experience any of these symptoms after consuming fish, be sure to consult a physician immediately.

Evidence shows that infected individuals would be wise to avoid consuming fish, shellfish, alcoholic beverages, oily foods and nut or seed products as the severity or duration of the symptoms may increase. For varying periods of time after initial symptoms subside, consumption of these items can cause symptoms to re-occur. To date there is no definitive treatment, however, some success has been achieved with an infusion of intravenous Mannitol administered during the first 48-72 hours. (Palafox, N.A., Journal of the American Medical Association, May 13, 1988, Vol. 259, No. 18) HawaiiChemtect has a blood test currently being used in research projects, Ciguatetect-H™, as a diagnostic tool for those who are suspected of having contracted ciguatera poisoning. No known antitoxin exists.

There are also reports that the toxin is present in mother's milk of infected women and in semen. Cases show it can also adversely effect a fetus, therefore, pregnant and nursing women should exert the highest degree of caution.

#### *HOW CAN I PREVENT GETTING CIGUATERA POISONING WHEN TRAVELING?*

In general, the disease can be avoided if the following precautions are taken (Craig 1980; Halstead 1968; Grant 1984; Lange 1987; Lee 1980; Rege et al., 1979; Withers 1982):

1. Avoid eating fish caught in endemic regions — check with the local Health or Fishery Department.
2. Avoid eating fish considered harmful by [indigenous people]; do not eat scaleless fish or moray eel.
3. Avoid abnormally large carnivorous fish especially large predacious reef fishes such as groupers, barracudas, snappers and jacks, on the premise that the larger the fish, the more toxin it is likely to have absorbed.
4. Avoid the liver, head, gonads or viscera of any fish.
5. Beware of eating reef fish after any aggression or disturbance to their environment.
6. In most instances, research shows you should choose fish harvested from the leeward side of an oceanic island if possible [the Hawaiian Islands are an exception to this rule].

If ciguatera, or any other type of fish poisoning is suspected, the person should follow these measures (Environmental Epidemiology Program, State of Hawaii, 1987):

1. Call a physician immediately for treatment. If the patient's physician is not available, call the nearest Poison Center.
2. Do not take drugs or medications without the physician's advice.
3. Save the remainder of the fish (including the head and the gut) in the refrigerator or freezer to be given later to the Department of Health or a suitable organization for laboratory analysis. [HawaiiChemtect provides these services.]
4. Call the Department of Health, Poison Center or suitable organization to report cases of fish poisoning.

#### *IS CIGUATOXIN FOUND EVERYWHERE?*

This toxin is regularly reported in: The Caribbean, Florida, French Polynesia, American Samoa, Hawaii, Papua New Guinea and Australia. Favorable environmental conditions for the growth of these toxin producing organisms exist in a broad circumglobal belt extending from 35 degrees north to 35 degrees south latitude. Since most of the world imports fish from these areas (tropics, semitropics and temperate zones) the regions reporting outbreaks of ciguatera poisoning are all inclusive. The incidence of Ciguatera Fish Poisoning has been increasing throughout all reportable areas.

#### *DOES EVERY FISH GET CIGUATOXIN?*

No. The overwhelming majority of fish consumed in the United States are safe to eat. However, in temperate waters more caution is required. While over 400 species worldwide are known to carry the toxin, just as the type and severity of symptoms can vary from person to person; so, too, does the kind of fish which are infected vary from area to area. A fish species is susceptible based on its eating habits and the condition of the area in which it feeds. It is best to check with the local health department or fisheries department for lists of suspect species in the area. The following are a sampling of those that have consistently been reported as having evidenced varying levels of toxicity and are listed by region:

#### Caribbean:

Several species of Lutjanus, dolphin, snappers, barracuda, dorado, amberjack, and grouper.

Florida:

Grouper, snappers, kingfish, amberjack, dolphin, barracuda, jack, and mullet.

French Polynesia:

Sphyræna barracuda, grouper, snapper (three varieties), wrasse, and surgeon fish.

Hawaii:

Jack, amberjack, eel, flagtail fish, mullet, wrasse, goatfish, surgeon fish, snapper, grouper, and parrotfish.

Australia:

Narrow-barred Spanish mackerel, mackerel, school mackerel, spotted mackerel, giant dart, gray mackerel, barracuda, coral trout, flowery cod, spotted cod, cod, grouper, wirenetting cod, red snapper, yellow sweetlip, yellowtail, kingfish, kingfish, trevally, lowly trevally, coral cod, Maori wrasse, venus tusk fish, dart, southern fuselier, and barramundi.

Other fish in varied regions include the moray eel, sea bass, shark, big eye scad fish, flagtail fish and squid. In general we can state that the number of species reported have a direct correlation to the amount of research being conducted in that region.

*WHY HAVE I NOT HEARD OF THIS BEFORE?*

A few years ago the general public had not heard of ciguatera, and with good reason. There was no way to be certain that a fish was contaminated. However, in the 1970's research into the cause and detection of fish borne toxins had significant breakthroughs. The publication of research results and findings from rudimentary tests, began to sensitize doctors, government agencies and disease control centers to the problem. Except for raw shellfish related reports, Ciguatera Fish Poisoning is now the most commonly reported non-bacteria seafood related disease in the United States. Outbreaks of ciguatera have been reported in the mass media throughout the world.

In San Francisco in July of 1989, twenty-four persons were stricken after consuming barracuda bought at a farmers market. Just one mullet with a rather toxic liver felled eight Floridians and a grouper from southern waters infected several people in Kansas. Many cases are reported by tourists who travel to these temperate regions and consume the local fish.

Papua New Guinea, as reported in Pacific Island Monthly, has an infection rate of 12,000 cases per 100,000 people with a perceived death rate of 24 cases per 100,000.

In the Marshall Islands, the incidence has become so frequent that symptoms are recognized by all physicians and it is there that the emergency Mannitol treatment was discovered.

*IS ALL FISH POISONING CIGUATERA?*

No. There are several different types of fish poisoning not related to ciguatera. In addition to illnesses which come from high bacteria or virus counts, a partial list includes: Diarrhetic Shellfish Poisoning (DSP) caused by okadaic acid and related to poor storage of the product; Scombroid Poisoning caused by spoiling of fish flesh by bacteria or a release of histamine-like compounds; Puffer Fish (fugu) Poisoning; and Paralytic Shellfish Poisoning (PSP) caused by red tide. DSP and PSP appear mostly in shellfish. The initial clinical symptoms in all these poisonings appear similar. The one symptom which may distinguish Ciguatera Poisoning is the hot/cold temperature sensory reversal.

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*Using SIRA Methodologies and a member of the Cowrie snail family, we discovered nature's blueprint for a Simplified, Inexpensive, Rapid & Accurate protocol to reduce CTX reef inspection from months to minutes.*

A component of SIRA's strategic and public service plans to educate and train societies strapped with endemic contaminated harvests in food-related environmental management. Since cattle, poultry and swine are managed in contained areas and therefore continuously visual — we are up-to-the-minute aware of their individual health and that of their environment. Fishery products, on the other hand are, to a great degree, migratory. No one can positively say where such fish have been before they are harvested. The exception, of course, is fish farmers who bring their own particular food adulteration problems to the table.

This migratory-related ambiguity creates a particular set of environmental issues that impact tourism, local sustenance, and industry.

If safe and wholesome, recently-arrived migratory fish are harvested above a toxic reef or floor bed — it is likely that the site will remain a point of harvest because it is thought to be safe. That would guarantee sending unavoidable dangerous product on its way to the table. The opposite scenario, an adulterated harvest above a pristine site, would mistakenly mark the site as dangerous and translate into loss of sustenance for indigenous peoples, loss of profit for industry and, if the site is at or near a resort, lost guests.

To provide a global model to avoid these potential complications, SIRA chose to conduct a study on the Kona Coast of Hawaii's Big Island. It is a study that used SIRA methodologies. The methods applied in utilizing the system have been transferred by SIRA, through the UN, to China, the Philippines, Puerto Rico, The Dominican Republic and Venezuela.

It all came to fruition due to our thesis that "Biomarkers," (life forms that are sedentary on reefs and thus always feed there) could be tested for contamination germane to their specific environment. While we used trained scientists as divers in the study, we also used students from high schools and universities who performed at equal levels of efficiency and, as such, gave ample evidence that the process could be replicated anywhere quite nearby by anyone.

Of further interest, Our [Damsel Fish Study](#) which indicates that fish can sense toxic food.

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**POLYMYOSITIS AND CIGUATERA FISH POISONING**

Stanford and Dartmouth Universities, in an interesting mutual agenda, collaborated with SIRA Technologies relative to CTX poisoning. One of their professors became alarmed when his mother fell ill with Polymyositis soon after an episode of intoxication from CTX. Polymyositis is a particularly debilitating muscle disease and a possible cause-and-effect linkage to an environmental issue was worthy of contemplative pursuit.

**Polymyositis After Ciguatera Toxin Exposure**

Elijah W. Stommel, MD, PhD; Julie Parsonnet, MD; Lawrence R. Jenkyn, MD.

"Biopsy-proved polymyositis subsequently developed in two patients who were severely poisoned by ciguatera fish toxin. Ciguatera toxin may have several mechanisms of action and may represent more than one toxin. The patients' clinical courses and the unlikelihood of coincidence of contracting both diseases suggested to us a causal relationship. Although we cannot prove this relationship, we suggest a mechanism by which the toxin predisposed the muscle to inflammation." (*Arch. Neurol.* 1991; 48:874-877)

Dr. Stommel at Dartmouth Medical Center has published additional papers on this subject. [Elijah.W.Stommel@hitchcock.org](mailto:Elijah.W.Stommel@hitchcock.org)

Also see:

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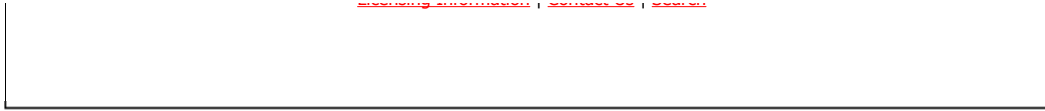
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CFP Questionnaire

THIS QUESTIONNAIRE IS INTENDED MERELY TO AID YOU AND YOUR DOCTOR IN EVALUATING YOUR SYMPTOMS. IT REFLECTS A COMPILATION OF THE MOST COMMONLY REPORTED AILMENTS FROM VARIOUS RESEARCH PAPERS, SPECIALISTS AND OTHER KNOWN CTX PATIENT COMPLICATIONS. HOWEVER PLEASE NOTE THAT THERE ARE OVER 150 SYMPTOMS ATTRIBUTED TO POST-CIGUATERA INTOXICATION.



Download the CFP Questionnaire (.pdf)

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