Ladies and Gentlemen, members of the Canada-Nova Scotia Offshore Petroleum Board, I would like to take this opportunity, this evening, to thank you for allowing me to address the Strategic Environmental Assessment.

For the next few minutes I will speak with you about such thing as munitions being sensitive, reacting when coming in contact with other munitions and their components and sections of the seabed becoming sensitive to disturbance from munitions constitutes or sensitive munitions that have penetrated the seabed with the potential to create a far greater disaster. I do this to give you an understanding of some of the complex issues that must be addressed by the CNSOPB before they proceed with exploration in the Misaine Bank Region. In order for the CNSOPB to safely proceed with exploration they should seriously consider conducting risk mitigation on how Petroleum Producers operations will effect the present state of munitions and hazardous wrecks sites at sea. Any mitigation must be conducted with an experienced munitions expert that understands the complexity and created the ability to develop any mitigated measures that may be required. The risk assessment completed by the munitions expert should be included in the Strategic Environmental Assessment along with any mitigating measures require to move forward safely.

As you may be aware only recently DND acknowledged major dumping of Hazardous Materials including conventional and chemical munitions at sea. It is estimated that there are in excess of 180,000 tons of conventional munitions dumped between Cape Breton and Newfoundland and Labrador. Munitions at sea dumped sites may have been spread by trawlers, currents and tides. Much of the munitions dumped at sea will remain intact for many years to come, whereas large quantities of munitions were dumped in the 1960’s. In the future some of these munitions dumped at sea may begin to wash up on shores and beaches of Atlantic Canada. As marine activities increase in the coming years encounters with munitions may become the norm. In other areas complete fish stocks and their habitats may be threatened from munitions constituents such as lead azide, lead styphnate, picric acid and mercury fulminate to name but a few.

There are large munition dump sites off Cape Breton which the Petroleum Board should recognize as a potential risk to the environment, injury and death from Petroleum Producers operations on the ocean. We need to develop policy, processors and standards with the Petroleum Produces to insure the safety of their employees while operating on and in the ocean. By mitigating munitions interactions with Petroleum Producers we can protect our vital marine resources from any accidental chemical release or high-order-detonation.

The last several years Nova Scotia has developed their own Oil and Gas Sector with a view to economic proprietary for the Province. In Cape Breton with the closures of the Coal Mines and Steel Plant, many including the government felt the Oil and Gas Sector would be the savior for the Island. As you may be aware there have been economic gains on mainland Nova Scotia with very few coming to Cape Breton. In fact the Sydney Area Chamber of Commerce’s Oil and Gas Committee can no longer get members to attend meetings, some feel that there is no Oil and Gas Sector in Cape Breton, only in Halifax. The perception may be true whereas, presently we are mitigating the Misaine Bank Region off Cape Breton with an environmental company from Halifax. Some thought should have gone into the planning and awarding of a contact to mitigate the Misaine Bank Region by engaging a Cape Breton environmental company/s, which there are several in the region. Also, there is an national environmental engineer firm, with a strong science affiliation in Cape Breton that conduct remediation and control programs for munitions internationally. Some local people believes the CNSOPB and the ESRF should engaged local organizations to address any concerns in the region from munitions. The CNSOPB continues to address Cape Breton’s Oil and Gas Sector from Halifax, a form of disengagement that disconnects the board from the community, what we need is constructive engagement so we can work together towards solutions.
Buying Time Rather Than Remediation

Munitions are a serious threat across Canada, they are on lands in our rivers, streams, lakes and Ocean, left uncheck they will create a Deadly legacy for our children.

I would like to take this opportunity to read the following article, which demonstrates the level of effort or lack of effort that the Department of National Defense (DND) has carried out to address munition sites. One must remember that DND determines how much cleanup will be done, if any, when it comes to pollutants their Department created. DND continues to downplay the risk to public safety when it comes to munitions buried on land and dumped at sea.

Our Country urgently needs an independent body to address munitions contamination in Canada! If we continue to use the bandage approach there will be more civilian death in Canada from the legacy of munitions dumping!

Bombs lie on bed of serene Quebec lake
By INGRID PERITZ
Friday, August 19, 2005 Updated at 5:20 AM EDT
From Friday's Globe and Mail

Nicolet, Que. — Canada is a land of lakes, from the pristine to the polluted, but there's surely only one body of water like the famed Lac St- Pierre -- armed, dangerous, and with the unfortunate potential to go boom. Surrounded by several towns in Quebec, the lake looks on its surface like a postcard of Zen tranquillity. Herons float above its languid waters, and tall grasses sway in a late-summer breeze. But like a horror flick, its watery secret is what lies beneath.

For nearly 50 years, through the Cold War and subsequent military efforts, the Department of National Defence used this UNESCO-recognized natural wonderland as a munitions testing site. Year after year, soldiers used Lac St. Pierre as a firing range to test artillery. Today, the Canadian army has left an explosive legacy. Some 300,000 shells lie on the lake floor. And, to the chagrin of residents and local mayors, an estimated 8,000 of the shells are unexploded. "This is a cemetery of shells," Clément Dubois, mayor of Nicolet, said on a boat ride on the lake this week. "It just makes no sense."

The name that has become the byword for the artillery's lasting threat is Pierre Gentes. In 1982, while he and fellow merrymakers gathered to celebrate Quebec's St. Jean Baptiste holiday, a partygoer picked up a shell onshore and, in the dark, threw it on a bonfire. The shell, which had separated from its cone-shaped detonator, apparently resembled driftwood. In fact, it contained two kilograms of explosives. Mr. Gentes died in the blast and nine were wounded, some of whom suffer hearing loss to this day.

The shells can still cause periodic commotion. In 2001, local resident Louis-Marc Bergeron picked one up near a highway and decided to take it home to his village of Saint-Léonard-d'Aston. In the ensuing panic, about 20 people were removed and the army and provincial police bomb squads were called in.

Over the years, shells have been carried by springtime ice to as far as Île d'Orléans, past Quebec City, some 150 kilometres downriver from where they were fired. The firing range, the Munitions Experimental Test Centre, is in Nicolet, 100 kilometres northeast of Montreal. "I don't want to dramatize, but having unexploded shells hanging around the bottom of a lake is simply dangerous," said Louis Plamondon, the Bloc Québécois MP for the area who is pressing the federal government to act.

"We're lucky we haven't had an accident. But we sense that National Defence is trying to buy time, instead of trying to find a way to do a cleanup."

Lac St-Pierre may well have been one of the most idyllic firing ranges to be found. The lake itself -- actually a widening of the St. Lawrence River -- is considered an environmental jewel. Home to the largest heron habitat in North America, it's also a migratory bird sanctuary, a wetlands with rare plant life, and a rich ecosystem that landed it a designation as a UNESCO biosphere reserve in 2000.
A Global Problem

“The world’s oceans have always been mankind’s favorite dump. Today they are home to more than 200,000 tons of chemical weapons disposed of willy-nilly in the years following World War II. No one knows what kind of health and environmental risk these munitions pose today or will present tomorrow.” Ron Chepesiuk, “A Sea of Trouble?”

The problem of sea dumped munitions has been known to occur in every ocean of the world. Sites can be found on both the east and west coasts of Canada, including the waters in and around Nova Scotia and Cape Breton Island. Most sea dumping of chemical and conventional munitions started after World War I and carried throughout World War II and the Cold War. This practice continued up to the 1970s, when world governments began to understand the impact these dumps created on the environment and marine ecosystems.

The NATO scientific community assessed Sea Dumped Chemical Munitions at more than three times as much as the total chemical arsenals reported by the United States and Russia. While Conventional munitions dumped at sea is believed to exceed 1,000,000 tons.

The disposal of chemical and biological warfare agents at sea was prohibited internationally by the London Convention in 1972, and implemented by Canada through the Ocean Dumping Control Act in 1975. The Chemical Weapons Convention, which was entered into force in April 1997, bans production, acquisition, stockpiling, transfer and use of chemical weapons, and compels its signatories to get rid of their arsenals by 2007. Chemical weapons and agents dumped at sea are exempt under the CWC and are considered disposed.

The closure of U.S. military installations in Newfoundland and Labrador, particularly at Argentia and Stephenville, among others, was a source of widespread munitions dumping on the East Coast of Canada. It is reported that from Argentia large transport vessels made numerous trips to dump at sea. One such vessel, the USS Calhoun County, made four trips in October 1960 for ammunition disposal, another...
A research report on Sea Dumped Munitions and Hazardous Wrecks Sites in the Atlantic Region was prepared for the Department of National Defense. The report identified 50 high risk sites in Atlantic Canada that requires additional research to determine the potential risks they posed.

Although the research identified 50 high risk sites, the researchers were not given access to restricted files at the National Archives on munitions disposal sites nor did they collaborate with the Canadian Hydrographic Services on munitions disposal sites which most likely would identify additional hazardous sites.
Map and sites identified within are Not to Scale

The information researched in the report was collected from the public domain and is cursory at best. The research does not adequately reflect the situation on the east coast of Canada, whereas some wrecks are identified in the wrong locations and other wrecks/sites have been de-listed by Department of National Defense that pose a direct threat to human life and the safe operations on the ocean by petroleum producers and fisherman.

There are additional sources of information available in the public domain other then DND that identifies risks (munitions & wrecks) in the Misaine Bank that must be included in any mitigation or environmental assessment of the region. The Misaine Bank Region should be mitigated by an independent munitions expert that is well diverse with a knowledge of the sites and handling energetic materials including risk mitigation. The CNSOPB must not use the cursory report has a "go-forward-bases", but one of the many sources of information that need to be researched and evaluated by an independent munitions expert.
Problem Recognition

Helsinki Convention (1992) identified the following risks:

- Sea dumped munitions do pose a threat to photosynthesis of plankton, and
- to the hatching rate of crustacean eggs

NATO scientific community sponsored a workshop in 1996 that identified the following risk:

- Major chemical releases starting in the year 2005 in every Ocean of the World

In 1992, the Helsinki Commission convened a special working group designated to deal with problems related to dumped chemical munitions within the Helsinki Convention Area, and that is in the Baltic Sea. This special working group, consisting of members representing the Baltic States and Scandinavia, along with others from the United Kingdom and the United States, examined the various problems arising from the chemical munitions dumped into the Baltic Sea until 1947.

The commission noted that some of the more commonly dumped munitions do pose a threat to the photosynthesis of plankton and to the hatching rate of crustacean eggs. Specifically, their report noted that "warfare agents can persist locally in the sediment of elevated concentrations for a long period of time." These agents include those containing arsenic, as well as viscous mustard gas.

In an attempt to bring focus to the problem, the NATO scientific community sponsored an advanced research workshop on sea-dumped chemical munitions, held in Bellagio, Italy, in April 1996. This conference provided the opportunity to draft an action plan to prevent inertia on this potential ecological time bomb.
A post-conference bulletin issued by conference organizers stated: Although the risk of sea-dumped munitions does not meet the eye, the corrosion of the shells and rounds which were dumped five decades ago is progressing fast now. It is feared that major quantities of chemical agents will leak into the sea by 2005. Beyond the immediate impact of a further depletion of the world’s endangered fish stocks, poisonous agents will enter the food chain via plankton.

This does not mean that major and minor chemical releases are not taking place as we speak and that releases will not continue long after 2005.
### Potential Toxicity Effects

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Chemical Composition</th>
<th>Potential Toxicity Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNT</td>
<td>2,4,6-Trinitrotoluene C₆H₃N₃O₆</td>
<td>Possible human carcinogen, targets liver, skin irritations, cataracts</td>
</tr>
<tr>
<td>Tetryl</td>
<td>2,4,6-Trinitrophenyl-N-methylnitramine C₆H₃N₃O₆</td>
<td>Coughing, fatigue, headaches, eye irritation, lack of appetite, nosebleeds, nausea and vomiting</td>
</tr>
<tr>
<td>Picric acid</td>
<td>2,4,6-Trinitrophenol C₆H₃N₂O₇</td>
<td>Headache, vertigo, blood cell damage, gastroenteritis, acute hepatitis, nausea, vomiting, diarrhea, abdominal pain, skin eruptions and serious dysfunction of the central nervous system</td>
</tr>
<tr>
<td>RDX</td>
<td>Hexahydro-1,3,5-trinitro-1,3,5-triazine C₃H₃N₃O₆</td>
<td>Possible human carcinogen, prostate problems, nervous system problems, nausea, vomiting</td>
</tr>
</tbody>
</table>

Seismic pluses have potential to damage thin skin chemical munitions, which could dramatically increase the numbers of chemical releases in an area at one time. Dr. Jennifer Mokos, Vice-President, Alion Science and Technology, in her presentation to the Canadian Senate Standing Committee on Fisheries and Oceans she noted that: “If a dump site is disturbed enough to cause some sort of release, it could decrease the fish stock by approximately 70%. This is just an example of what some of the outcomes could be.”
CHARACTERISTICS OF ORDNANCE AND EXPLOSIVES (OE)

By their nature, ordnance and explosives (OE) and other munitions pose environmental risks.

When disturbed, OE may present an imminent hazard and can cause immediate death or disablement to those nearby.

Different types of OE vary in their likelihood of detonation. The explosive hazards depend upon the nature and condition of the explosive fillers and fuzes.

Munitions can explode, injure and kill long after they have been dumped at sea.

The first rule one learns as an Explosive Ordnance Disposal student is; that; when dealing with unexploded ordnance you must **always air on the side of caution** to protect property, personal injury and life. Too many lives have been lost by not utilizing approved safety precautions and processors while working in and around munitions.

HMS Raleigh sunk off the coast of Labrador has claimed the lives of four residents; as a result of these munitions. **Four too many.**
Lead azide will react with copper in the presence of water and carbon dioxide to form copper azide, which is an even more sensitive explosive.

Ammonium nitrate will react with iron or aluminum in the presence of water to form ammonia and metal oxide.

TNT will react with alkalis to form dangerously sensitive compounds.

Picric acid easily forms metallic compounds, many of which are very shock sensitive.

Standard military explosives are reactive to varying degrees, depending on the material, conditions of storage, or environmental exposure. Precautions must be taken to prevent their reacting with other materials. Chemical reactions within these dumpsites are critical issues along the path to assessing their impact on the marine environment and any risk that may be associated from seismic or others marine operations. Because of these reactions, and others not listed, military munitions are designed to be free of moisture and any other impurities, and not to be in contact with any metals other than the metal(s), such as aluminums, forming the explosive mixture. Therefore, munitions that have not been properly stored or disposed of may be more unstable and unpredictable in their behaviour, and more dangerous to deal with than normal munitions.

This is also true for munitions that are no longer intact, have been exposed to weathering processes, or have been improperly disposed of. Accordingly, Sea-Dumped Munitions, will in many cases undergo a chemical change and as a result may be more unstable and unpredictable in their behaviour, and therefore be significantly more dangerous to handle than normal munitions.
Munitions, by their very nature, are sensitive to shock. All explosives are shock sensitive and therefore can be exploded by mechanical shock, such as that created from an energy pulse. Initiating explosives such as lead azide and mercury fulminate are detonated by mild shock, such as the tap of a pencil. Other explosives, such as TNT, require a sledgehammer blow to set them off.

The question that needs to be asked is, after 60 years on the ocean floor, how deteriorated are the casings of these munitions, and what will the pulses from powerful seismic testing guns do to these explosives?
Also of considerable concern is the possibility of munitions being damaged, where fillers, propellants and other munitions constituents may leach into the surrounding sediments and/or create a mixture of explosives. Such a mixture has the potential for the seabed to become sensitive to disturbance.

It is important to note that the most sensitive component is of particular interest, as this component has the capacity to set off other explosives in close proximity which in turn could cause a domino effect. The size of the event would be determent by the amount of munitions in close proximity to one another.
This issue has not yet been given adequate and comprehensive scientific analysis, the sea-dumped munitions are not covered by either the Chemical Weapons Convention (CWC) or other arms control treaties. In fact, the problem has been neglected for a long time on the international level. Only recently were official data made available from countries which admitted conducting dumping operations.

According to information published by Hunt Oil, one of the companies involved in exploration off the coast of Cape Breton, the sound in a radius of five meters from the airguns is at the level of 260 decibels, which is considered lethal. Up to 2,000 meters away, the sound is still at the 190-decibel level, which they consider to have possible physical effects on marine life.

It is important for us understand the effects of 260 decibels. The human threshold of pain is a mere 130 decibels. At 160 decibels, human eardrums perforate. According to Dalhousie University Professor Martin Willison, 200 decibels vaporizes fish into tiny particles. As Professor Willison said, 200 decibels is 'just way, way beyond the word loud.”

Hunt Oil with approval from the CNSOPB may conduct seismic in the coming months off of Cape Breton over some of the largest munitions dumps in the world in approximately 60 meters of water! This without any mitigation by an experienced munitions expert.
Explosive detonations which occur underwater create shock waves in a similar manner to explosions in air. Due to the elastic properties of water, the shock wave tends to be of shorter duration, but with a proportionally larger peak overpressure. The energy in the underwater shock wave attenuates very quickly with range. Therefore, the shock wave from an underwater explosion does not create the same level of damage as one would expect from studying explosions in air. This is not to say that there are no effects from underwater shock waves. Most underwater explosion are not seen on the surface due to the elastic properties depending on the depth of water and the size of the net explosive weight.

The time has come to map our marine resources in order to protect them.
The Petroleum Board is officially a Federal Authority under the Canadian Environmental Assessment Act (CEAA). Legislation, implemented in January of 1990, established the Board as a joint independent agency of the Governments of Canada and Nova Scotia responsible for the regulation of petroleum affairs and safe practices offshore Nova Scotia. The Board regulates the offshore petroleum industry on behalf of both levels of governments.

The Department of National Defence is tasked with protecting our homeland and our vital interests abroad, from peacekeeping to peace enforcement and recently with the additional tasking of the war on international terrorism. How can the department, with an already limited budget and manpower, adequately address sea-dumped sites when the environment is not one of the top 10 priorities within the department framework? Do they buy a tank or remediate a munitions site?

It is not the Department of National Defense responsibility to mitigate how sea dumped munition sites may interact with petroleum producers operations on the ocean. However, they should be included as one of the vital sources of information that would be reviewed by an independent munition expert. If DND advises the CNSOPB that it is safe to conduct seismic in an area for example Sydney Bite or the Misaine Bank region, then their (DND) Minister or Deputy Minister should clearly state in a signed letter to the CNSOPB that is safe to do so and that they have mitigated all operations carry out by the petroleum producers to insure their safety.

Furthermore, DND have create the ecological time bomb by their dumping practices, they are investigating sites with their staff as well as others, reporting and determining the level of cleanup to be conducted, if any, and may be advising others such as the CNSOPB that the munitions are of no concern to the safe operations of petroleum producers on the ocean.

With over twenty-five years experience safely handling and disposing of chemical and conventional munitions including energetic materials, successfully completing all Canadian Forces Explosive Ordnance Disposal (EOD) Courses, including the NATO Advance EOD at the British Army School of Ammunition, conducting research at the national archives on sea dumped sites, Advance Intelligence course for the collection, processing and disseminations of military related information, Program Manager for the detection demonstration of sea dumped munitions technology at MARE Island US Navy Shipyards, formally appointment Canadian Forces Base Toronto Explosive Ordnance Disposal Chief, appointed to the United Nations as a Mines and Ordnance Survey Officer, and my past experiences with DND clearly demonstrates to me, that there is an immediate risk to the environment, injury and death from Sea Dumped Munitions and Hazardous Wreck Sites off of Cape Breton and Newfoundland. I would hope that the CNSOPB is hearing this warning and that they will carry out the proper program to insure the safety of the petroleum producers employees.
The ESRF is a research program which sponsors environmental and social studies designed to assist government/regulatory decision-making related to oil & gas exploration and development on Canada's frontier lands. The purpose of the ESRF is to finance environmental and social studies pertaining to the manner in which and to the terms and conditions under which petroleum exploration, development, and production activities on frontier lands should be conducted.

There is a lack of acknowledgement by the ESRF board that petroleum produces operations will impact munitions dumped at sea and that they exist in CNSOPB Oil and Gas Blocks. The Ministers responsible should intervene on behalf of all Canadian to insure the ESRF funds the required studies to insure the safety of petroleum producers employee while operating on the ocean. We must act responsibly by conducting risk mitigation on the Misaine Bank with an independent munitions expert to insure the future economic growth of both industries.
After all the ocean is vitally important to the economies of Nova Scotia and Atlantic Canada. When one considers that fish processing, tourism, traditional fishing, transportation and aquaculture are all bound tightly with the ocean we begin to understand the value of the ocean from an economic perspective. Ocean industries in Atlantic Canada account for $6.76 Billion of GDP or 16% of the total GDP of the region.

In order for co-excising to exist between fishing and the Oil and Gas industries one must act reasonably by conducting risk mitigation to protect our vital marine resources.
Our Legislation requires that the CNSOPB, a Board, officially a Federal Authority under the Canadian Environmental Assessment Act (CEAA) insures the safe operations on the ocean during all phases of offshore petroleum activities, from exploration to abandonment. The CNSOPB must understand these munitions and wreck sites could impact on future Oil and Gas activities in Atlantic Canada.

The CNSOPB should use their board position on the ESRF Management Board to request them to finance environmental and social studies pertaining to the manner, terms and conditions under which petroleum exploration, development, and production activities on frontier lands may impact munitions and hazardous wreck sites from their operations. This would allow the CNSOPB to make an informed decision on how munitions may or may not impact oil and gas activities now and in the future, as well as develop and implement any mitigative measures to protect everyone from an accidental release or detonation.

Sea Dumped Munitions and Hazardous Wrecks Sites off the east coast of Canada including Newfoundland and Labrador can be risk mitigated from an accidental explosion or chemical release from Petroleum Producers operations on the ocean, all that is needed is the will and the funding!

Thank you for your time and consideration.