

A View of The Arrow Spill and Its Effects on The Chedabucto Bay Area



Photo by: Government of Canada. 1970. Atlantic Oceanographic Laboratory Bedford Institute. Report of the Task Force Operation Oil (Clean-up of the Arrow oil spill in Chedabucto Bay). The Minister of Transport, Dartmouth, Nova Scotia. Volume III.

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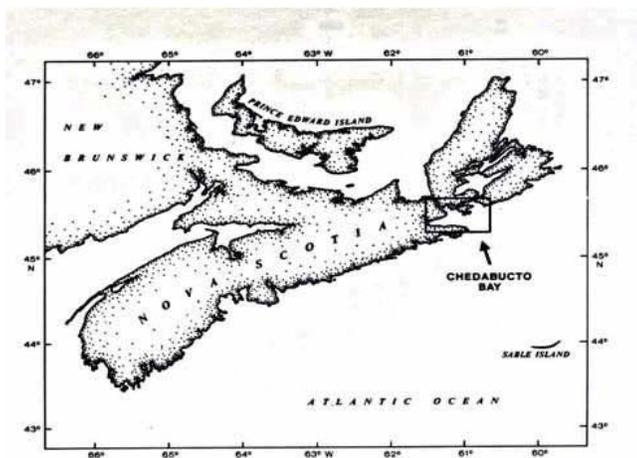
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Appendix A: The Arrow Spill

Chedabucto Bay is a considerably large mass of water (As shown in Figure 1, pg.3), which extends thirty miles in length and eight to ten miles in width. It divides the Northern Shore of mainland Nova Scotia, which includes Guysborough County, beginning from the Southern Coast of Cape Breton, and including the coast where Richmond County is located. This location has a unique history because of the events surrounding the Arrow's unfortunate destruction in February of 1970 (Boudrot, Jake. Report [online, 2001]). The first portion will explore the social and economical history of the affected areas of the arrow spill, demonstrating the impacts of the arrow spill on the affected coastal Nova Scotia counties. This presentation will examine the construction and background of the Arrow tanker until it grounded. The grounding of the Arrow altered the lives of Chedabucto Bay residents and lets not forget the people responsible for the massive oil spill clean up. In addition, a close-up of the spills affects on the Lobster, Fish, and Scallops stocks.

As early as the 1600's the large amounts of fish in the Chedabucto Bay attracted the French and the Basque fishers. Historians refer to the French and the Basque as nomadic Europeans that fished in the waters of Chedabucto Bay. When the fish were caught they dried or salted them and landed the fish in temporary settlements before departing for Europe to sell or trade fish for other goods. As the value of fish rapidly increased, so did the amount of effort and conflict around the deep harbours and the indispensable fishing grounds neighboring Petit de Grat, Arichat, Canso, and Guysborough Town (Boudrot, Jake. Report [online, 2001]).

Figure 1: Chedabucto Bay shown as a geographical location



Source: Government of Canada. 1970. Atlantic Oceanographic Laboratory Bedford Institute. Report of the Task Force Operation Oil (Clean up of the Arrow oil spill in Chedabucto Bay). The Minister of Transport, Dartmouth, Nova Scotia. Volume II, pg. 1.

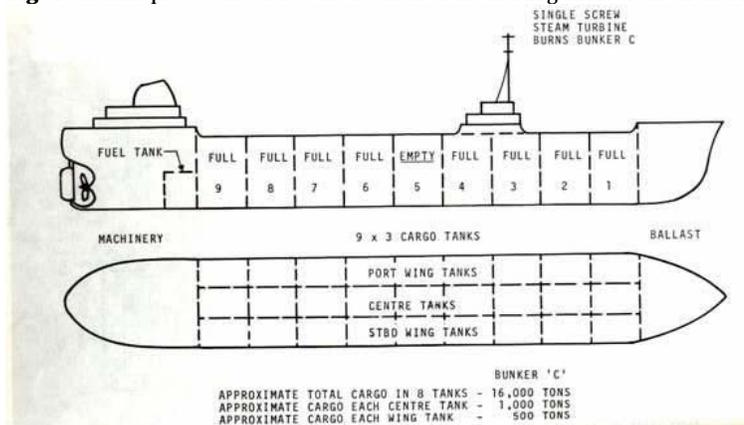
The temporary settlements quickly transferred into permanent empires in North America because of the increased value of fish products. Forts and permanent settlements relocated native villages right through Atlantic Canada and around the valued Bay's. This began decades of constant conflicts and battles between the French and the British over land and fishing grounds. With the British Crown exploiting and taking a hold on North America, increased amounts of English settlers moved into Chedabucto Bay. The English settlers included nine men known as merchants whom aided in the introduction of the free market system to the area such as; the Guysborough and Richmond County. The counties people once restricted to fishing or farming for survival, now were provided with wage labour opportunities in a fish plant or in some cases started their own business, all of which overwhelmingly assisted their communities (Boudrot, Jake. Report [online, 2001]).

During the Depression years people feared for their survival and this increased numbers left their roots in search for employment in central Canada and New England, thus creating a trend of out migration. This resulted in Arichat losing its township status and many communities lost future leaders and intelligent young youths. The out migration of the town's people also included the businessmen and once again the community was left to rely on the fishing industry as a sole survivor. After the depression these previously discussed counties faced increased problems on their fishing stocks such as; the Ichthyosporidium disease (1953-1956), Canso Causeway (1955), temperature change, and more importantly the Arrow Spill of 1970 Boudrot, Jake. Report [online, 2001]).

The Arrow tanker was constructed as a steam tanker with a length of 529.4 feet, a breadth of 63 feet, and a depth of 37.5 feet, and a gross tonnage of 11,379.37 tons with a net tonnage of 6,897 tons. In 1948, Bethlehem Sparrows Point Shipyard Inc. at Maryland constructed the Arrow. It was designed to hold twenty-seven tanks for carrying petroleum products with nine tanks in the centre, starboard and on her ports wings (As shown in Figure 2, pg.6). The owner of the Arrow was Sundstone Marine and was the company's main asset. On the other hand the Arrow was operated by Olympic Maritime, a company that managed an additional sixty-five ships (Government of Canada Volume III, 1970).

Olympic Maritime ships were all oil tankers and bulk carriers with a range from 16,000 tons dead weight to 200,000 tons. Most of the Companies ships were under ten years of age, in contrast the Arrow was twenty-two years old when it grounded (1970) and was the second oldest ship in the fleet. There were thirty-three men including the Captain, officers, and crew on board. The Capt. George Anastassopoulos had never taken the Arrow into Canadian waters, even though she had already made fifteen satisfactory voyages into Canadian ports. The Arrow was loaded at Amuay Bay, Venezuela and then headed for the Nova Scotia's Pulp and Paper Mill in Point Tupper, Richmond County with 16,000 of Bunker C. During the period of the early 1970's, the ships approaching Point Tupper were to proceed beyond Cerberus Rock before following a pilot boat to dock, and from the document information this was the intention of the Captain on the early morning of February 4, 1970 (Government of Canada Volume III, 1970).

Figure 2: This picture illustrates the location of the holding tanks of oil on the Arrow.



Source: Government of Canada. 1970. Atlantic Oceanographic Laboratory Bedford Institute. Report of the Task Force Operation Oil (Clean-up of the Arrow oil spill in Chedabucto Bay). The Minister of Transport, Dartmouth, Nova Scotia. Volume III.

Now that the social and economical histories of the areas surrounding the grounding of the Arrow have been clearly established, what caused the Arrow to sink? What impact did it have on the surrounding communities? Who was involved in the clean up and how did it take place? These are the questions that will be addressed in the final section of this presentation. On February 4, 1970 the Arrow was on route to Nova Scotia Pulp Limited carrying 108,000 barrels of Bunker C fuel oil and was chartered to Imperial Oil Limited for the trip. As the Arrow entered into Nova Scotia, it was faced with heavy rain and

high winds, which have been documented as southeast winds gusting at 60 knots. While entering the Chedabucto Bay the winds forced the Arrow against Cerberus Rock (As shown in figure 3) and eventually grounded the Arrow and allowed 3.5 million gallons of Bunker C oil into the Bay. The spill contaminated 190 miles of coastline in Richmond and Guysborough Counties with a lasting affect on the residents' social and economical livelihoods (Scarratt, D.J. Sprague, J.B.; Wilder, D.G. et al, 1970).

Figure 3: Geographical area surrounding the Arrow spill. Cerberus Rock grounded the Arrow and is represented by the Red border.



Source: Government of Canada. 1970. Atlantic Oceanographic Laboratory Bedford Institute. Report of the Task Force Operation Oil (Clean up of the Arrow oil spill in Chedabucto Bay). The Minister of Transport, Dartmouth, Nova Scotia. Volume II.

Counties effected by the Arrow oil spill developed their livelihoods around the fishing industry, and it is without question the spill would affect the areas main sources of income such as; the fish, lobster, and scallops. These are only a few species affected by the spill and this altered the residents' livelihoods it is fair to say anything that came in contact with the oil was disturbed. For example, birds that came into contact with the spill were completely covered with oil and caused a large number of deaths. Towards the end of February during the clean up period there was a total of forty-two dead fish found in the areas of Janvrin's Lagoon, Janvrin's Island Causeway and Janvrin's Harbour areas (Wilder, D.G., 1970).

These fish occupy shores in the shallow water areas where large amounts of oil were found. On the other hand, the oil may not have been the soul problem of the dead fish. In close examination of the fish it was found that oil was present in the feces, but not in the gills, it is also important to note that the samples were taken from the bottom of the Bay where there was a high concentration of oil (Boudrot, Jake. Report [online, 2001]). In a further studies it was found that the fish population did not suffer major mortality rates from the oil spill, but did the oil spill affect reproduction levels? This information is not documented and the documented information does not make conclusions of significance (Wilder, D.G., 1970). There also has been in-depth studies on lobsters in which were affected by the oil spill in an attempt to insure that their meat was safe for human consumption.

A short time after the spill occurred, spring like temperatures arrived and as the water temperature increased so to did the appearance of lobsters. The lobsters that were found were normal in behavior and clean, but one lobster was found with oil on the ventral surface. This began a process of intense studies to explore the effects of bunker C on lobsters. The Fisheries Research Board of Canada (May 1970) conducted ten experiments involving lobsters smeared with Bunker C oil, testing to see if lobsters would eat bait smeared with bunker C, and lobsters exposed to Corexit 8666. The experiments varied in procedure, but all had a main purpose. The main purpose was to expose lobster to Bunker C oil and examine its effects in the form of taste test. There was a taste panel of 24 volunteers in which evaluated the lobster they tasted as A, B, C, or D. D. E. Graham arranged the experiments and made the observation and the general conclusions are as follows:

1. "Lobsters liberally smeared with Bunker C oil and promptly returned to running sea water lose 90% of the oil within 6 hours."
2. "No tainting of meat of tomalley from smeared lobsters could be detected after 4 and 8 days in running sea water."
3. "Lobsters readily eat bait smeared with Bunker C oil."
4. "No definite tainting of meat or tomalley from lobsters fed smeared bait could be detected after 4 and 8 days in running sea water."
5. "Meat and tomalley of lobsters immersed for 90 hours in sea water containing 1 part per 1000 Bunker C oil or 1/1000 Bunker C oil and 1/1000 Corexit 8666 acquire a very objectionable, oily flavour."
6. "Tomalley becomes more strongly flavoured than meat."
7. "Tainting persists in meat for more than 3 weeks and in tomalley for more than a month."
8. "Meat becomes tainted before lobsters are boiled."
9. "Clean lobsters boiled in water containing appreciable amounts of bunker C oil do not become tainted."
10. "Meat or tomalley from lobsters immersed for 116 hours in sea water containing 1 part per 1000 Corexit 7664 does not become tainted."
11. "Lobsters can withstand short immersion in sea water containing 1/10 Corexit 7664."
12. "Short immersion of smeared lobster in high (10%) concentrations of Corexit 7664 does not quickly and completely remove Bunker C oil."
13. "Short immersion of smeared lobsters in (10%) Concentrations of Corexit 7664 does not taint their meat."
14. "Short immersion of smeared lobsters in high (10%) concentrations of Corexit 7664 does not appreciably facilitate the complete removal of Bunker C oil over a 12 -day period in running sea water."
15. "Short immersion of smeared lobsters in full strength Varsol facilitates the removal of Bunker C oil."
16. "The meat and tomalley of smeared lobsters briefly immersed in Varsol become tainted."
17. "Wiping smeared lobsters with full strength Corexit 7664 or Corexit 8666 is an effective, initial step in removing Bunker C oil."
18. "If used with caution, wiping lightly smeared lobsters with full strength Corexit may have commercial application."

Figure 4. Lobster used in above experiment, which is covered with Bunker C oil.



Source: Wilder, D.G. 1970. The tainting of lobster meat by Bunker C oil alone or in combination with the dispersant Corexit. Fisheries Research Board of Canada (Manuscript report series).

The above conclusions came from the Fisheries Research Board of Canada, Author D.G. Wilder (May 1970). Simply, these studies concluded that lobsters affected by the arrow spill oil would not have any long-term affect on lobster meat when used for human consumption. In contrast, LFA's (Lobster Fishing Areas) 29 and 30 were closed in 1970 because of the high concentrations of oil present in the area. The fishermen were given extended EI benefits, but in turn had to work with the clean-up crew in order to qualify for the extended benefits (Local Fishermen, 2001). The fishermen lost income from their traditional lobster fishery and no other affected LFA received any compensation for damaged to gear or loss of income (Government of Canada, Volume III, 1970). In addition, the scallops were also sampled and tasted to insure they were not contaminated.

The scallops were investigated and results indicated oil was in the digestive tract and in the organs. With in a short period after the arrow spill, the task force discovered a reduction in clams and it was reported that the clams had a 20% mortality rate. Nothing could be done well enough to assistant cleaning and saving the clams from suffocation, which resulted in large amounts of deaths. During the investigation it was found that clams exposed to long periods of air showed signs of recovery (Government of Canada, Volume III, 1970).

In April and May the task force excavated clams and found that the oil had found it's way down to the bottom of the bay in pools. Once again an in-depth investigation was conducted on the clams which revealed that oil was still in the digestive tract and other major organs. Even as late as June there was still oil present in the clams and because the affects of human consumption were not proven, therefore the beds which were harvested by locals, were closed although no more clams were found dead after June (Government of Canada, Volume II, 1970). Six years after the arrow spill a study was conducted by Dr. E.S. Giffman of Bowdoin College, which revealed that clams found in areas where oil was still present had reduced populations and an modified age distribution (Boudrot, Jake. Report [online, 2001]). Exceedingly, the arrow spill had a tremendous impact on the environment and financial well being of the areas surrounding the oil spill. Environmentally, almost every living thing in the Bay was affected in one form or another. The spill had financial consequences; some absorbed by the fisherman, government agencies or local businessmen.

The environmental impacts of the oil spill was, a massive tragedy affecting species from shellfish, lobsters, fish, plankton, aquatic plants, and seabirds. These species were in some cases killed, relocated or burdened by Bunker 'C' oil spilled into Chedabucto Bay. In addition the large slicks pushing their way around the Bay affected the beaches, rivers, lakes, lagoons, ponds, and coves. The entire spill claimed 190 miles of shoreline and pollution still remains today, in some form, eating away at cliffs and sandbanks along the coast (Boudrot, Jake. Report [online, 2001]).

The arrow spill left behind 2.5 million gallons of Bunker C that established a mixture containing approximately 33-35% water. Because of the high concentration of water the possibly of burning the oil would be difficult, and also would disturb absorption agents such as peat moss, eelgrass, and straw. In contrast, the firmness of the mixture did assist in mechanically removing the oil and prevented a portion of the oil from spreading. Hope was provided with Biodegradation, a form of bacteria that could attack the thin layers of oil. In addition, some oil found its way into plants and animals. The arrow spilled 8000 tons of oil spreading over an estimated 305km of the existing 604km of shoreline, but only 48km were cleaned during Operation oil (Government of Canada, Volume II, 1970).

During the period between March and May one third of the affected area was cleaned by the task force and wave action caused by nature. During the first two years nature rapidly aided in cleaning the oil spill and it has been documented as cleaning up to 75% of the heavily affected areas around 1973. In 1973 the remaining oil in the Bay was concentrated in an inconsistent circulation around the low-energy lagoons and estuaries on the north shore of the Bay. The period between 1975-1976 the affected sites were once again inspected revealing traces of oil, but Black Duck Cove still had high concentrations of oil from the spill. Although, there was layers of oil 2-3center meters thick in some places resembling pavement. In 1978 oil still remained on

"...the southern and western shores of the Bay, only the area around Durelle Island remained heavily oiled. Oil mixed with sand, gravel, and rocks in a "pavement-like" consistency covered the upper half of the intertidal zone in most of the sheltered locations in the area. The northern shore was the most heavily oiled. By this time only an occasional patch of oil remained on the exposed northern coast with exceptions of Crichton Island, Janvrin's Island, and Inhabitants Bay. In sheltered area like Haddock and Port Royal harbours, oil mixed with coarse sand and gravel, was found in layers several centimeters thick, 5-10 cm below the surface" (Boudrot, Jake. Report [online, 2001]).

Today the oil, which was spilled in the grounding of the arrow in 1970, still remains in the Bay and surrounding areas, but in low amounts and usually can not be noticed directly on shore unless the temperature is 18 Celsius. On the other hand the oil which remains can be seen on shore anytime, but becomes a problem with warm temperatures. For example, the oil will stick to your clothing, foot attire etc. Without considering the pollution the arrow created in the Bay and on its shorelines, one should consider the impact the people faced living around the affected areas. The homemakers were faced with extra cleaning of such thing as; children's clothes and pets carrying the oil indoors, and people working in the clean up bringing the oil home. The arrow spill completely altered the lives of the people around the affected areas; the beaches could not be used for pleasure for fear of contamination. This means the children could not swim because of the high concentration of oil and repeated proposals were submitted to government to build a community swimming pool, but they were all rejected. Understandably, the residents of the affected areas demanded answers, and more importantly compensation for the tragedy that had ruined their pristine environment. (Government of Canada, Volume IV, 1970). The environment was deeply affected and it also rippled through the area's economy causing financial consequences; some absorbed by the fisherman, government agencies or local businessmen.

The arrow spill affected thousands of people, but approximately 1,000 fishermen had the most to loose. Not including other important species, the lobster fishery generated a considerable portion of household income for the inshore fishery. The season opened April 1st, but because of the spill the lobsters had to be examined to insure public safety when consumed.

"Only small amounts of oil were found on the lobster grounds and it was concluded that the meat and tamale of lobsters would not be tainted

and that any oiling of the lobster's exterior could be cleaned by immersion in running seawater. The Scientific Coordination Team concluded that there was no evidence that the oil spill had altered the yield of fishing gear, ships, docks, and other equipment" (Boudrot, Jake. Report [online, 2001]).

Although, they did not find evidence that the oil spill effected the lobster, two lobster areas (LFA 29, 30) were closed in 1970, as previously discussed. The Canadian Government contributed an estimated \$3.1 million dollars to decrease the pollution from the arrow spill. This dollar amount includes expense such as; employed workers, government agencies, use of government equipment and the Lennox Passage dam. On the other had Imperial Oil played a minor role in the clean up which has been estimated in a dollar amount of over \$900,000. Other costs were absorbed by the Nova Scotia Government and through local donation of money and time (Scarratt, D.J; Sprague, J.B.; Wilder, D.G. et.al, 1970).

The task force aided some fishermen in the cleaning of their gear, but the fishermen incurred the cost and time in cleaning their boats. The fishermen could receive compensation only if they could provide evidence that they had economic loss due to interrupted operations. On the other hand the fishermen had to put up with the miserable conditions the arrow spill caused and endure through the oil in the Bay. The lobster fishery had annual catches of approximately 490,000 pounds with a value of \$338,000 just in the Chedabucto Bay including 700 fishermen. The fishermen were affected, which rippled through to the plant workers and to the local economy (Scarratt, D.J; Sprague, J.B.; Wilder, D.G., 1970).

The area of the oil spill maintained four processing plants and employed approximately 800 workers. The four plants consumed large amounts of water and the risk of contamination was present until adequate filter systems could be installed and some plants had to look for other water supplies. The affected communities also suffered from a decline in the tourism because of the oil spill. The summer visitors usually came to occupy the beaches, but because they were polluted by the oil spill, people stayed away. Although the task force had cleaned the beaches they were repeatedly being reoiled with wave action and other natural causes and in turn were not attractive in the early 1970's. The fishermen and local residents of the affected areas demanded aid from the government for financial damages from the spill and prevention of future tragedies of this nature. Unfortunately, the communities could not get financial damages from the ship because it was destroyed and had no value. The communities were further restricted if they wanted to take action against the owners of the ship because the company had no assets in Canada. Therefore, the problem was that the Canadian Shipping Act only allowed for a maximum of \$730,000 and without assets in Canada they would have to enforce the law in another County, Panama (Boudrot, Jake. Report [online, 2001]).

The locals exhausted all avenues for financial compensation and received nothing. The people of the affected areas were left to face the damages of the arrow oil spill day. This was of course a huge pill to swallow and left a persistent feeling of unpleasantness for years after (Boudrot, Jake. Report [online, 2001]). The arrow oil spill on February 4, 1970 has effected the Chedabucto Bay fishery, environment, financial loss and the altering of the resident's livelihoods. The arrow oil spill was by far the most horrifying experience the affected areas had to face in this time period, and in a sense set a precedents for mistreatment and manipulation by large corporations and government, which the people of the Chedabucto Bay areas still face today.

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