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# "Under Fathoms of Salt Water"

## Canada's Ammunition Dumping Program, 1944-1947

ALEX SOUCHEN

*Abstract: This article examines Canada's ammunition dumping program in the mid-1940s and pays special attention to the practical and technical dilemmas that influenced policy making and implementation. A pressing logistical crisis followed the end of the Second World War as crowded armaments depots ran out of storage space for leftover ordnance. In July 1945 a major explosion at the Bedford Magazine in Halifax Harbour heightened public safety concerns and influenced future disposal policies. From a range of imperfect destruction methods, dumping emerged as one of the most efficient alternatives; whenever possible conventional and chemical munitions were submerged. Although the quantities sunk by the Americans, British, and Russians dwarf the amount dumped by Canada, the Canadian dumping program was no less important to the nation's postwar transition or without serious ramifications for Canadians and their coastal environments.*

AT 6:30 PM on the evening of 18 July 1945 a fire broke out on the south jetty of Canada's largest ammunition depot, the Bedford Magazine in Halifax Harbour. The fire quickly spread to nearby stacks of ammunition that exploded and then up the hill to other piles of shells temporarily stored outside because of overcrowding in the stowage bunkers. Unable to contain the raging inferno, first responders and civilians alike evacuated while a chain reaction of explosions continued for twenty-four hours, completely destroying the south end of the facility and damaging many other buildings. In the end, this "other" Halifax Explosion killed one person and injured dozens more, so it was nowhere near as devastating as the 1917 tragedy that levelled large parts of the city and killed almost 2,000

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Photo 1: The Bedford Magazine Explosion at night. [J. C. M. Hayward, Nova Scotia Archives, Accession No. 1981-517 3, 18 July 1945]

people.<sup>1</sup> However, the Bedford Magazine Explosion was nonetheless an important turning point in the history of Canada's postwar demobilization.

The causes and consequences of the Bedford Explosion demonstrate the complexities involved in the process of ending war. The incident highlighted perhaps the most pressing issue facing the Canadian military once Germany was defeated. Victory precipitated a major crisis in logistics and storage; and the destruction of the Bedford depot only made the crisis worse. When the Second World War ended, the munitions and supplies accumulated to fight did not just disappear. Rather, they lived on in peacetime and continued to occupy physical space regardless of their potential utility or obsolescence. Moreover, until their primary form and function was modified, unused munitions and supplies maintained the capacity to fulfill their intended purposes—which, in the case of ordnance, was to explode, kill, and maim. Not only were these assets a serious

<sup>1</sup> For background information see: John Griffith Armstrong, *The Halifax Explosion and the Royal Canadian Navy: Inquiry and Intrigue*, (Vancouver: UBC Press, 2002) and H. Millard Wright, *The Other Halifax Explosion: Bedford Magazine July 18-20, 1945*, (no publisher, no date).

threat to public safety, but they also confounded military and civilian authorities with a continuing financial and logistical burden. In effect, the disposal of leftover ammunition and explosives was an issue that demanded special attention in a disposal program designed to accommodate the military's rapid demobilization. However, quickly divesting such large amounts of unneeded materiel proved quite challenging to operate and oversee immediately following the war.

So what happened to all the bombs and bullets produced during the war that were never used in combat? The short answer is: they were thrown into the oceans. Following the Second World War, vast quantities of unneeded ammunition and explosives were intentionally submerged to facilitate disarmament. Ocean dumping was a useful disposal method, as it eliminated the remaining bulk of German and Japanese fighting potential and also aided in the demobilization of Allied fighting forces. Pioneered after the Great War, ocean dumping was seen as an efficient and safe disposal method for both conventional and chemical weapons, and the practice continued until prohibited by the *Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter* (commonly known as the London Convention) in 1972.<sup>2</sup>

This article examines Canada's ammunition dumping program and pays special attention to the practical and technical dilemmas that influenced both policy making and implementation. The war's end created a pressing logistical crisis for the Canadian military that resulted in the Bedford disaster, while the explosion heightened concerns for public safety and influenced disposal policies to favour the immediate destruction of surplus munitions. From a range of imperfect destruction methods, dumping emerged as one of the most efficient alternatives and was adopted to divest surplus and captured ordnance whenever feasible. Canada's postwar dumping program involved all types of conventional and chemical munitions common to the Second World War and took place along the country's eastern and western shores as well as in the Great Lakes and European coastal waters. Although the quantities sunk by the Americans, British, and Russians dwarf the amount dumped by Canada, the

<sup>2</sup> In 1975, Parliament passed the *Ocean Dumping Control Act* to meet Canada's international obligations for controlling marine pollution. Environment and Climate Change Canada, "Disposal at Sea," <https://www.ec.gc.ca/iem-das/default.asp?lang=En&n=55A643AE-1> (accessed 1 August 2016).

Canadian disposal program was no less important to the nation's postwar transition and had serious ramifications for Canadians and their coastal environs.

### THE POSTWAR STORAGE CRISIS

The origins of Canada's dumping program started with the nature of wartime industrial production. From the outset, the war unlocked an avalanche of public and private investment that rejuvenated the national economy after a decade-long depression. Between 1939 and 1943, the manufacturing sector's net value of production increased by 167 per cent.<sup>3</sup> Largely on the back of new manufacturing capacities sponsored by the government, Canada's GNP rose from \$5.6 billion in 1939 to almost \$12 billion in 1945, and the value of the country's total expenditures on all types of war goods (including munitions, supplies, defence construction, and military pay) totalled roughly \$28 billion.<sup>4</sup> By 1945, Canadian factories had built some 9,000 ships, 50,000 armoured vehicles and tanks, 16,000 aircraft, 850,000 military-pattern vehicles, and 1.5 million firearms. The industrial front also churned out 72 million artillery and mortar shells and a whopping 4.4 billion rounds of ammunition—enough to shoot two bullets at every human on the planet in 1945.<sup>5</sup> With the exception of military-pattern vehicles, Canada's production totals were eclipsed by its largest Allies. The Americans produced a mind-boggling 41 billion rounds

<sup>3</sup> O. J. Firestone, *Locations and Effects of Wartime Industrial Expansion in Canada 1939-1944* (Ottawa: Department of Reconstruction, 1945), 1.

<sup>4</sup> Michael Hennessy, "The Industrial Front: The Scale and Scope of Canadian Industrial Mobilization during the Second World War," in Bernd Horn, ed., *Forging a Nation: Perspectives on the Canadian Military Experience* (St. Catharines, ON: Vanwell Publishing, 2002), 143; O. J. Firestone, *Encouragement to Industrial Expansion in Canada: Operation of Special Depreciation Provisions, November 10, 1944-March 31, 1947* (Ottawa: Department of Reconstruction and Supply, 1948), 13.

<sup>5</sup> Jeffrey Keshen, *Saints, Sinners, and Soldiers: Canada's Second World War* (Vancouver: UBC Press, 2004), 42-45; Hennessy, "The Industrial Front," 141-44; J. de N. Kennedy, *History of the Department of Munitions and Supply: Canada in the Second World War, Vol. I: Production Branches and Crown Companies* (Ottawa: HMSO, 1950), 3-9; Canadian War Museum (CWM), *Looking Ahead: The Job We've Done, Canadian Post-War Affairs, Discussion Manual No. 2* (Ottawa: HMSO, 1945), 24-25.

of ammunition while the British produced over 11 billion rounds.<sup>6</sup> To put it mildly, these totals constituted a phenomenal amount of firepower that does not include everything manufactured by the Axis powers. Although it is difficult to extrapolate consumption rates or estimate what was left over in 1945, it is reasonable to infer that a large portion was expended, a significant amount was maintained for postwar requirements, and substantial quantities were sold or transferred to other Allies as military aid.<sup>7</sup> However, the remainder of war-related materiel posed a serious dilemma and captured enemy weaponry only complicated matters further.

After years of conflict that brought death and destruction to every corner of the globe, political and military leaders had no illusions about the dangers of leftover ordnance. They knew how disrupting these items were to political, economic, and social stability and they also understood that ammunition would not simply disappear. Lethal assets required special disposal procedures that hinged almost entirely upon procuring sufficient storage space and efficient destruction methods. When hostilities ended, finding the space to deposit these hazardous stores became a major quagmire. To illustrate the point, consider the logistics of Canada's industrial war effort as water moving through a pipeline. When the valves at the war front were closed in May 1945, the water that had already entered the pipeline at one end backed up at the other, thus creating a growing reservoir of surplus materiel.<sup>8</sup> However, the underlying problem stemmed from the fact that Canada's pipeline was designed to extract resources, manufacture munitions, and distribute them overseas as quickly as possible. It was not designed to hold items in prolonged or indefinite storage.

<sup>6</sup> Arthur Herman, *Freedom's Forge: How American Business Produced Victory in World War II* (New York: Random House, 2012), iv and 335; David Edgerton, *Britain's War Machine: Weapons, Resources and Experts in the Second World War* (London: Penguin Books, 2012), 274-76.

<sup>7</sup> For examples, see: Sam Lebovic, "From War Junk to Educational Exchange: The World War II Origins of the Fulbright Program and the Foundations of American Cultural Globalism, 1945-1950," *Diplomatic History*, Vol. 37, No. 2 (April, 2013): 280-312; "The Dutch Inheritance (1): Deelen Demob Vehicle Park," *Wheels & Tracks*, No. 55: 30-42.

<sup>8</sup> Library and Archives Canada (LAC), RG101 Crown Assets Disposal Corporation fonds, Vol. 1, File: R-1-1-9, Radio Speech on the CBC by C. D. Howe, 23 October 1944, 1-7.

Throughout the war, the Departments of Munitions and Supply (DMS) and National Defence (DND) resorted to constructing additional buildings or leasing property to meet their expanding spatial needs. The Royal Canadian Navy, for instance, owned and operated about 1.3 million sq. ft. of storage space throughout the war and leased another 926,000 sq. ft. to meet its operational needs. However, demobilization triggered significant budget cuts and downsizing. According to the estimates of A/Captain G. L. Roome, the Director of the Navy's Disposal Organization, the postwar navy did not have the money to rent property from civilian sources while several base closures dropped the Navy's total available storage capacity to 1.145 million sq. ft.<sup>9</sup> Since this was not enough to maintain a sizeable postwar fleet, there was an added incentive on clearing out unneeded kit; surplus assets could not take up stowage space ahead of operational stores.<sup>10</sup> Yet the unwanted objects would not simply dematerialize on their own initiative. In order to aid the military in downsizing materiel requirements and coordinate a disposal program to support the postwar transition, the federal government established two disposal agencies, the Crown Assets Allocation Committee (CAAC) and the War Assets Corporation (WAC). These two organizations became important pillars of demobilization.

Both the CAAC and WAC derived authority from order-in-council PC9108, issued on 23 November 1943, and later the *Surplus Crown Assets Act*, passed by Parliament in July 1944. The CAAC was an inter-departmental committee and administrative hub for all surplus declarations. It formulated general policies, facilitated inter-departmental transfers, and consigned all surpluses to the WAC for final disposal. The WAC handled all physical aspects of disposal by collecting, storing, maintaining, selling, or destroying all surpluses in accordance with CAAC recommendations.<sup>11</sup> By the summer of 1945, both organizations were fully integrated as staff in the WAC's procurement branches held dual appointments in the CAAC's head

<sup>9</sup> LAC, RG24 Department of National Defence fonds, Vol. 11686, File: CSS 1-2-2, "Decommissioning of H. M. C. Ships," A/Captain G. L. Roome, 9 April 1945, 1-2.

<sup>10</sup> Twelve months after VE-Day the Navy had downsized almost all its rented storage facilities. LAC, RG24, Vol. 8178, File: NSS 1813-1, "Memorandum to the Deputy Minister," Captain G. B. Hope, 22 June 1946.

<sup>11</sup> Alex Souchen, "Peace Dividend: The War Assets Corporation and the Disposal of Canada's Munitions and Supplies, 1943-1948," (PhD Dissertation, Western University, 2016), 56-78 and 81-132.

office, while the Chairman of the CAAC, John Berry, became President of the WAC in July. Before taking on the disposal job, Berry served as the Director-General of Automotive Production and Motor Vehicles Controller. He remained with the WAC until July 1949.<sup>12</sup>

At its peak, from the fall of 1945 to the spring of 1947, the WAC managed over 6 million sq. ft. of indoor storage space at fifty-one warehouses spread across the country. In conjunction with the military, it also maintained several aircraft, vehicle, and ship graveyards where larger weapon systems were cannibalized and stored until sold or scrapped.<sup>13</sup> However, ammunition and explosives posed a separate challenge that an empire of temporary facilities could not always accommodate in peacetime. To safely store bombs and bullets they need to be placed in secure, weather-resistant, lightning-safe, and purpose-built magazines. When the war ended, these specialized facilities quickly turned into crowded chokepoints as each branch of the Canadian military consolidated its inventories. Although disposal policies were already in place by that time, the amount of ordnance and the speed at which it piled up caught everyone off guard.

The storage crisis became most acute at Bedford. In early March 1945, naval officers in Halifax and Ottawa attempted to accommodate the growing bottleneck by acquiring several buildings in Dartmouth known as Hazelhurst Barracks. In April the Navy drew up plans to lease the buildings from the Army, but they were thwarted by the local Wartime Housing Administrator who objected to the plan on 10 May. In the wake of the VE-Day riots, which exposed the depth of tensions between the military and civilian populations in Halifax, some immediate countermeasures had to be taken to ease the city's housing shortage. As a result, the Housing Administrator

<sup>12</sup> LAC, RG32 Public Service Commission fonds, Vol. 598, File: Berry, John Hatton, "Employees History Record – Questionnaire," 1-2 and "Civil Service of Canada – Application Form," 1-4; Carolyn Cox, *Canadian Strength*, (Toronto: Ryerson Press, 1946), 85-87; House of Commons, *Special Committee on War Expenditures and Economies, Minutes of Proceedings and Evidence* (hereafter SCWEE), 20 November 1945, (Vol. 2, No. 1), 4-5.

<sup>13</sup> Some boneyards maintained war diaries: LAC, RG24, Vol. 22791, War Diary (WD) – No. 1-11 Surplus Equipment Holding Units, 1944-1946. See also: Paul Ozoak, *Abandoned Military Installations of Canada*, (no publisher, 1991).



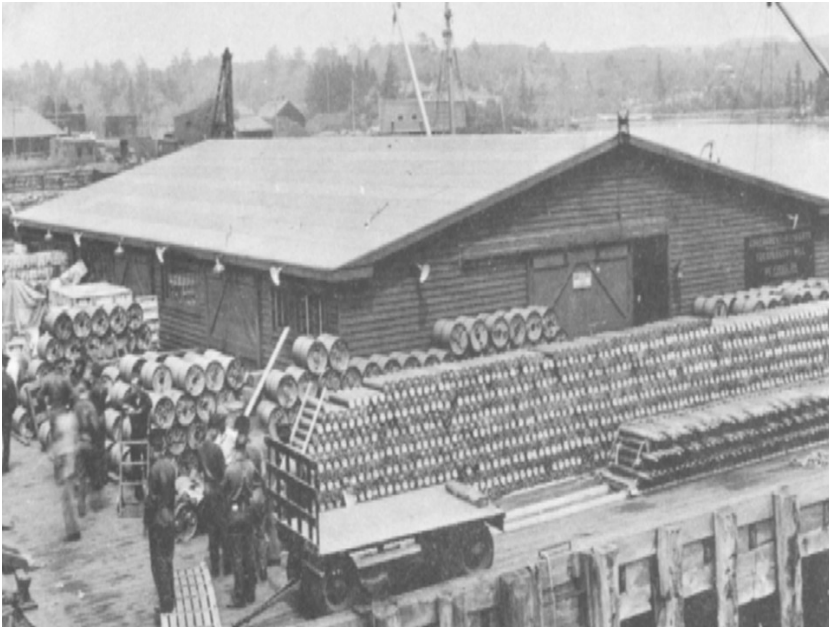


Photo 2: Building 69 looking back towards the Bedford Depot from the south jetty. This was the epicentre of the explosion. ["Events Leading Up to the 1945 Explosion," Plate 22]

could not repurpose habitable buildings for ammunition storage.<sup>14</sup> The Navy had to look elsewhere and eventually found other facilities at St. Polycarpe, Quebec (once the British vacated their magazines), Argentia, Newfoundland (where the Americans had built large bunkers), and in Renous, Nova Scotia.<sup>15</sup> Yet this extra space did little to resolve the overcrowding that only continued to escalate once overseas shipments ceased and combat vessels returned to port. From 1 May to 18 July 1945, Bedford's north and south jetties were frantically busy de-ammunitioning a total of eighty-three ships. Most of these vessels were frigates and corvettes, but at least twelve

<sup>14</sup> LAC, RG24, Vol. 34395, File: N.S.S. 5135-1 Vol. 1, W. G. Mills Deputy Minister (Navy) to A. Ross Deputy Minister (Army), 9 March 1945 and 16 May 1945; Ross to Mills, 20 March 1945; Memorandum "Hazelhurst Barracks, Dartmouth N.S." H. S. Rayner (Director of Plans) to W. G. Mills, 5 April 1945 and 16 April 1945; and Memorandum "Hazelhurst Barracks, Dartmouth N.S." Secretary of the Naval Board to Commander-in-Chief, Canadian Northwest Atlantic, 10 May 1945. See also: Keshen, *Saints, Sinners, and Soldiers*, 71-93, 130.

<sup>15</sup> LAC, RG24, Vol. 34395, File: N.S.S. 5135-1 Vol. 1, "Storage of Ammunition," Deputy Minister (DMS) to W. G. Mills Deputy Minister (Navy), 23 May 1945; and W. G. Mills to Chief of Naval Staff, 26 September 1945.

destroyers emptied their entire arsenals into the depot's custody before the explosion. Without many alternatives, naval officers relied on "floating magazines" (anchored lighters and barges) to store the contents of at least twenty-six ships and scrambled to purchase tarpaulins for everything else piling up outdoors.<sup>16</sup> By mid-July at least fifty-five large tarpaulins (30 ft. by 30 ft.) were distributed to armament depots at Kamloops, Esquimalt, St. John, Shelburne, Sydney, Quebec City, and Bedford.<sup>17</sup>

Photographic evidence also shows the scale of congestion at Bedford. Photo 2 demonstrates that, at the south jetty's receiving and triage centres, ordnance was piled up densely near the water and in contravention of the military's safety regulations. Additionally, two aerial photographs (Photos 3 and 4) reveal a different perspective on the crowded facility. These large before and after images were taken in March and August 1945 and compiled by a committee of experts convened to investigate the explosion. Within that lunar landscape of the after image, two major craters are visible (one was 170 ft. wide by 90 ft. deep and the other was 130 ft. wide by 75 ft. deep), neither of which align with the surrounding storage bunkers in the before image. Thus, in the weeks before the explosion, personnel at Bedford stacked ordnance wherever there was space available thereby leaving large quantities of explosives in makeshift shelters that were not designed to contain the energetic force and debris of a detonation. The depot turned into a powder keg that was only one careless mistake away from igniting a disaster.

The investigative committee published two reports under the chairmanship of Lt-Col. G. Ogilvie, the DMS's Director of Ammunition Filling and Chairman of the WAC's Plant Decontamination Committee. The first report was ready in late August and it examined the explosion's causes and consequences, the military and civilian responses, and the cleanup operations. The second was published in October and it

<sup>16</sup> Director General of Naval Ordnance, "Events Leading Up to the 1945 Explosion at RCN Magazines Bedford, N.S. and Clearance of Devastated Areas," (1949-1952), 9. Courtesy of John McCallum. (Hereafter "Events Leading Up to the 1945 Explosion").

<sup>17</sup> LAC, RG24, Vol. 34395, File: N.S.S. 5135-1 Vol. 1, R. M. Keirstead (Naval Stores Office, Halifax) to Director of Naval Ordnance, 5 July 1945; "Tarpaulin for Ammunition," G. W. F. Pringle (Naval Armament Supply Officer, St. John) to Director of Naval Ordnance, 23 June and 16 July 1945; and "Tarpaulins 30' x 30'" W. B. Finnigan (Naval Stores Officer) to Director of Naval Stores, 17 July 1945.



Photo 3 Aerial photograph showing the Bedford Depot in March 1945. Note the number and locations of the buildings and south jetty. [LAC, RG24, Vol. 8070, File: 1270-41]



Photo 4 Aerial photograph of the Bedford Magazine in August 1945. Note the destruction and the locations of the two major craters. [LAC, RG24, Vol. 8070, File: 1270-41]

made recommendations for redesigning and rebuilding the facility.<sup>18</sup> In attempting to determine what caused the explosion, Ogilvie's committee conducted some extensive research and interviewed several witnesses and first responders. Despite their efforts, the committee could not definitively prove what started the initial fire. The report speculated on several potential causes: the spontaneous combustion of flammable materials, a stack of ammunition suddenly shifting and striking a primer cap, or sparks from a coal-fired boiler on a nearby floating pile driver (though the report dismissed this cause since it was "banked at 4 P.M.").<sup>19</sup> The report concluded that the most likely cause "was considered to be fire, the probable origin of which was due to unauthorized smoking and carelessness with respect to disposal of ignited smoking materials."<sup>20</sup> The report added that this situation was compounded by the congestion, a laxity in enforcing safety regulations, and the personnel turnover caused by demobilization.

The fact that this congestion was allowed to develop begs an important question: why was the Navy not dumping ordnance into the Atlantic before July in order to resolve a dangerous situation? This question has some merit since the practice of "drowning" (a colloquial term used at the time) gained Privy Council approval on 4 August 1944 when PC6099 was issued on the recommendation of the DMS. PC6099 outlined the disposal process for surplus ammunition, bombs, and weaponry by identifying a hierarchy of organizations that could legally acquire them. The DMS had first priority for "war purposes" followed by other departments in the federal, provincial, and municipal governments. If no sale could be arranged "within a reasonable time" than the WAC was allowed to dispose of "such items...by the most suitable method of elimination, such as dumping into the sea or reducing to basic materials should such reduction be considered economical and the hazard involved therein be considered not excessive."<sup>21</sup> In practice, though, PC6099 retroactively approved disposal policies that the CAAC and WAC had established earlier in the year. Almost from the day the two organizations were formed, the armed forces declared a variety of "war-like material which is a

<sup>18</sup> LAC, RG24, Vol. 8070, File: 1270-41, G. Ogilvie to Douglas Abbott, 22 August 1945, 1-8; and G. Ogilvie to W. G. Mills, 1 October 1945.

<sup>19</sup> Ibid, "Royal Canadian Navy Press Release" no date, 3-4.

<sup>20</sup> Ibid, 3-4.

<sup>21</sup> PC6099, 4 August 1944.

danger to life” and military assets with “no known peace-time uses.”<sup>22</sup> From January to May 1944, these declarations included, among other things, approximately 12,000 cartridges of ammunition, 797 cases of dynamite, and 20,000 blasting caps left over in Newfoundland from building the Gander-Lewisporte-Bishop’s Falls highway.<sup>23</sup> As a result, the CAAC approved a special exemption that authorized the DND to destroy all unneeded small arms, ammunition, and explosives without formally declaring them surplus through regular channels.<sup>24</sup> Therefore, from May 1944 onwards the armed forces gained a free hand to dispose of surplus munitions without intrusive civilian oversight.

There were two general reasons why dumping was not taking place in order to cope with the storage crisis in mid-1945. The first reason had to do with the political interests at stake and the second was the mechanics of disposal operations. Over the summer of 1945, the military’s postwar budget had yet to be established. At the time, not only was the DND still technically at war in the Pacific, but its leaders were also fighting a war in Ottawa over its future size and shape. Since each branch of the Canadian military pressed the Liberal government for the largest possible budget, there was little utility in relinquishing large portions of their inventories, particularly before the Dominion election in June. Not only was this counter-productive to continuing combat operations, it was also detrimental to legitimizing their sizable postwar demands, which in the case of the Army included peacetime conscription.<sup>25</sup> The military was able to drag its feet because the European war had ended so early in the 1945-1946 fiscal year. For the most part, federal departments had the funding to maintain their inventories, while at the same time petition for a greater share of the next federal budget. This accounts for why March and April 1946—the end and beginning of the fiscal year—were the peak months of surplus declarations (for all types of

<sup>22</sup> *SCWEE*, 21 May 1946, (Vol. 3, No. 13), 340.

<sup>23</sup> LAC, RG101, Vol. 4, File: 1-1-13, Crown Assets Allocation Committee – Meeting Minutes (CAAC – Meeting Minutes), Schedule B 23 February 1944, Schedule D and E 21 April 1944.

<sup>24</sup> The Services provided lists of what ammunition was destroyed. *SCWEE*, 20 November 1945, (Vol. 2, No. 1), 13, 20, and 24.

<sup>25</sup> J. L. Granatstein, *Canada’s Army: Waging War and Keeping the Peace*, (Toronto: University of Toronto Press, 2002), 315.

assets, not just munitions). Federal departments waited until the last moment to abnegate public property.<sup>26</sup>

The mechanics of disposal operations also contributed to the overcrowding. Since the WAC's primary mission was to recoup as much money as possible from the sale of surpluses, it required time to find potential clients. Surplus items would only get reduced to constituent materials or completely destroyed if all potential sales were ruled out.<sup>27</sup> This resulted in a delay between the declaration of an item and its final disposal. Reports filed through the Army's Master General of Ordnance (MGO) Branch in April 1945 exposed this problem and its implications for the timing of demobilization. In effect, the WAC's selling priorities would hinder the military's ability to demobilize quickly after the war, particularly since it had yet to expand its warehousing capacity to relieve the military of custodial responsibilities.<sup>28</sup> Since surpluses remained in depots while the WAC tried to find clients, the space where the military could consolidate the assets it wanted to keep was adversely affected.

The lag between declaration and final disposal developed across all categories of goods, but it was felt most acutely at ammunition depots where storage space was at a premium. Although the WAC's warehousing capacities grew rapidly over the fall of 1945, it did not procure many storage facilities for ammunition and explosives because the DND's exemption was supposed to save it from funding the construction and operation of new magazines. However, an unforeseen complication arose when the DND chose to file surplus declarations for several types of weapons and ordnance in useable conditions or with potential civilian applications in highway construction, policing, and the mining industry.<sup>29</sup> Left with little alternative but to piggy-back on the military's facilities, the WAC rented space for ammunition storage and funded various disposal programs, which included

<sup>26</sup> "Number of Declarations of Surplus Received by Months, 1944-48," in *War Assets Corporation Fourth Annual Report* (April 1, 1947 to March 31, 1948), 7.

<sup>27</sup> *War Assets Corporation First Annual Report*, (July 12, 1944 to March 31, 1945), 3, 27-28; *War Assets Corporation Second Annual Report*, (April 1, 1945 to March 31, 1946), 3-8.

<sup>28</sup> LAC, RG24, Reel: C-8432, File: 9106-5 Vol. 1, "Position of Surplus Stores Declared by M.G.O. Branch," J. V. Young to Deputy Minister, 18 April 1945, 1-2. See attached appendices: "Typical Example of Stores Declared Surplus [Director of Ordnance Services (General Stores)] and Not Yet Disposed of War Assets Corporation," Appendix III, 1-2.

<sup>29</sup> Souchen, "Peace Dividend," 208-19.



Fiscal Year	Storage and Maintenance Costs	Cost of Ammunition Disposal	Cost of Mustard Gas Disposal
1945-1946	-	\$2,893.45	\$114,429.59
1946-1947	\$775,285.83	\$392,322.66	\$80,580.53
1947-1948	\$21,887.92	\$627,890.20	-
Total	\$797,173.75	\$1,023,106.31	\$195,010.12

Table 1: WAC Payments for Ordnance Storage and Disposal. Storage costs for 1945-1946 are not available. No money was spent on mustard gas disposal in 1947-1948. [*War Assets Corporation Second Annual Report*, (April 1, 1945 to March 31, 1946), 21-22; *War Assets Corporation Third Annual Report*, (April 1, 1946 to March 31, 1947) 26; *War Assets Corporation Fourth Annual Report*, 20.]

both the scrapping and dumping of ordnance. Table 1 charts the WAC's financial investments on ordnance storage and disposal. Over the 1946-1947 fiscal year, the Army received \$775,285 for storage services, but in the following year it was paid just \$21,887. This drop in storage costs, coupled with the dramatic rise in ammunition disposal expenses and the Navy's own expenditures on dumping (which totalled \$2,879,362 by April 1946), provides an indication about the peak and timing of dumping operations in the 1940s.<sup>30</sup>

Additionally, since the WAC's leadership expected the DND to make regular use of its ammunition exemption, they also assumed that space would become available in ordnance depots for weaponry declared surplus by foreign governments. Because of international agreements with the United States and the United Kingdom, all foreign-owned surpluses in Canada were declared to the CAAC and WAC.<sup>31</sup> Therefore, leftover American and British ordnance added to the congestion in Canadian depots. In fact, according to British records,

<sup>30</sup> *SCWEE*, 11 April 1946, (Vol. 2, No. 5), 124

<sup>31</sup> For Anglo-Canadian agreements see: Government of Canada, Treaty Series 1946, No. 10, *Agreement Between Canada and the United Kingdom on the Settlement of War Claims*, 6 March 1946; Robert Bryce, *Canada and the Cost of World War II: The International Operations of Canada's Department of Finance, 1939-1947*, Matthew J. Bellamy, ed. (Montreal & Kingston: McGill-Queen's University Press, 2005), 296-309. For Canadian-American agreements see: Government of Canada, Treaty Series 1946, No. 12, *Exchange of Notes between Canada and the United States of America Constituting an Agreement on the Subject of War Surpluses and Related Matters*, 31 March 1946; Stanley Dziuban, *Military Relations between the United States and Canada, 1939-1945* (Washington: Office of the Chief of Military History, 1959), 320-31.

a portion of what exploded at Bedford was later identified as British in origin.<sup>32</sup> Of course, in the immediate aftermath, the ownership and quantities that were destroyed remained unknown until a proper inventory was commissioned. As Captain R. W. Wood, the Director of Naval Ordnance, explained in a letter to an official in the DMS's Ammunition Filling Division, the lists of surplus ammunition were now outdated and had to be cancelled "due to the explosion in Halifax where most of the surplus ammunition was held." He continued, "in view of the above it is requested that the disposal of the ammunition as previously submitted be held in abeyance until a firm stock report is received from our Halifax depot at which time a new list will be forwarded."<sup>33</sup>

A few days later these orders were countermanded by Ogilvie. On 28 August, he recommended Wood forgo all inventory tabulations and "proceed from the standpoint of clearance rather than of future use" in order to commence "dumping at once."<sup>34</sup> Instead of inspecting everything found in the devastated zone, the ordnance was written off, not only because it was replaceable from other sources, but what had not already detonated was likely damaged. In fact some munitions, namely the 850 Mark XI depth charges, were especially volatile and required special attention to release the gasses that had built up inside them.<sup>35</sup> Thus, the urgency of the storage crisis and its implications for public safety crystalized in the minds of some military authorities who now realized that any policy delaying disposal might contribute to another accident and thereby jeopardize public safety in Halifax or elsewhere.

Expediting destruction programs became a paramount consideration after the Bedford Explosion. Not only was public safety at risk from accidental explosions, but there was also a possibility that criminals might acquire surplus munitions. For politicians and bureaucrats, the Bedford Explosion put an exclamation point on a growing wave of concern for public safety. Over the summer and

<sup>32</sup> The National Archives (TNA), ADM 1/17547, "Clearance of Surplus Ammunition Held in America and Canada," briefing note, paragraphs 5 and 6, December 1945.

<sup>33</sup> LAC, RG24, Vol. 34394, File: 5130-1, "Re: Disposal of Ammunition Surplus to Royal Canadian Navy Requirements," Captain R.W. Wood (Director of Naval Ordnance) to Mr. K. M. MacKenzie, 13 August 1945.

<sup>34</sup> LAC, RG24, Vol. 8070, File: 1270-41 Vol. 1, "Memorandum to the Minister," 28 August 1945.

<sup>35</sup> Ibid, G. Ogilvie to Douglas Abbott, 22 August 1945, 4.



fall of 1945, many people worried about the “flood of weapons going about the country.”<sup>36</sup> Almost overnight, gun violence, unregistered firearms, and unemployment became hot-button political and social issues. With government contracts terminating, the economy stuttered out of its wartime boom, just as nearly 2 million veterans and war workers looked to restart their civilian careers in a stagnant economy later gripped by unprecedented strikes and labour disputes.<sup>37</sup> Worst-case scenarios seemed to pop up everywhere. In one poignant accident, an Ottawa boy was shot and killed by a friend showing off a souvenir revolver. In another incident in late-October 1945, three thieves broke into the Canadian War Museum and stole weapons from several display cases, one of which was used in the shooting death of an Ottawa police officer.<sup>38</sup>

These events (and others like them) prompted some significant changes to Canada’s disposal policies. On 23 November 1945, Berry wrote to C. D. Howe, Minister of Munitions and Supply and Reconstruction, about making modifications to PC6099 and the WAC’s selling policies. In light of “recent events,” Berry was concerned about the length of time that surplus munitions were stored while the WAC found potential customers.<sup>39</sup> This meant that a major delay was built into the disposal process and obstructed the start of destruction programs. Berry wanted Howe to decide whether lethal stores should be kept for a “prescribed period” to await potential sales or destroyed immediately “if no known sale” was possible when they first became available.<sup>40</sup> It was clear that Berry favoured the second option and his minister concurred. “The matter is so important,” Howe wrote in his short cryptic reply of 5 December, that the Cabinet Committee on Reconstruction had to approve the new measures.<sup>41</sup> At a meeting a week later, Howe explained that “in view of the lack of market,

<sup>36</sup> As quoted in: R. Blake Brown, *Arming and Disarming: A History of Gun Control in Canada* (Toronto: University of Toronto Press, 2012), 156.

<sup>37</sup> Joy Parr, *Domestic Goods: the Material, the Moral, and the Economic in the Postwar Years* (Toronto: University of Toronto Press, 1999), 21-39, 61-70; Peter S. McNis, *Harnessing Labour Confrontation: Shaping the Postwar Settlement in Canada, 1943-1950* (Toronto: University of Toronto Press, 2002), 87-112.

<sup>38</sup> Brown, *Arming and Disarming*, 156; Andrew Burtch, “Dead Man’s Gun: True Crime in Postwar Ottawa 1945-1946,” *Ontario History* Vol. CII, No. 1 (Spring 2010): 1-19.

<sup>39</sup> LAC, RG101, Vol. 2, File: 9-2-1, J. H. Berry to C. D. Howe, 23 November 1945.

<sup>40</sup> Ibid.

<sup>41</sup> Ibid, C. D. Howe to Berry, 5 December 1945.

inadvisability in certain instances of general sale, and substantial costs of storage, it appeared desirable to destroy the goods in question rather than retain them in storage."<sup>42</sup> At his urgings, the Committee directed the WAC "to proceed with mutilation and sale as scrap of the arms and ammunition involved" if no known sale existed.<sup>43</sup> This slight adjustment on paper signalled a major change in disposal procedures as surplus munitions were now slated for immediate destruction instead of being held for possible sales. With postwar budgets confirmed by December, the timing was significant as the Canadian armed forces were on the verge of divesting even larger portions of their kit.

### **CANADA'S AMMUNITION DUMPING PROGRAM**

When hostilities ended, the standard procedures for all lethal stores were well-established on paper and tested with the limited amount of tactical equipment declared surplus before May 1945. The military would cannibalize weapon systems as needed to maintain operational requirements and declare the remainder surplus. Until the changes to PC6099, any dangerous items were stored by the armed forces pending the WAC's ability to sell to a select clientele of foreign governments, police forces, or dealers who acquired the requisite permits and passed the RCMP's background checks. If the "single purpose implements of war" could not be sold and no civilian applications were discovered then the items were referred to the WAC's Scrap Disposal Branch and Ammunition and Chemical Disposal Board for final disposition.<sup>44</sup> These organizations determined the best course of action and made recommendations for destruction. In regards to ammunition disposal, the DND kept these two agencies up to date about the types and quantities slated for drowning and,

<sup>42</sup> Ibid, Memorandum, V. W. Scully to J. H. Berry, 15 December 1945.

<sup>43</sup> Ibid; LAC, RG2, Vol. 121, File W-45, V. W. Scully to J. R. Baldwin, 7 December 1945 and attached exemplar.

<sup>44</sup> *SCWEE*, 20 November 1945, (Vol. 2, No. 1), 13; LAC, RG101, Vol. 7, WAC – Board of Directors, Meeting Minutes, 11 May 1944; LAC, RG101, Vol. 4, File 1-1-13, CAAC – Meeting Minutes, 19 May 1944; PC6099.

if necessary, the WAC directed the military to use an alternative destruction method.<sup>45</sup>

Munitions could only be destroyed through several imperfect methods. The available options included: abandonment, scrapping, incineration, and dumping. Of all the options, abandonment was the least preferable because it usually involved burial and maintained a continuing security liability since criminals might recover the ordnance, while changes in land use could yield a future danger for unsuspecting civilians. Abandonment was only considered viable if the items were in an unusable condition or if the costs of transport, storage, and reduction were too prohibitive. Large-scale controlled explosions were used, but the quantities that required destruction, their distribution across Canada and Europe, and the concussive force of the blast greatly limited the locations where this was logistically feasible.<sup>46</sup> However, small-scale detonations and open-air fires were employed more frequently, though the facilities and furnaces that industrialized this process only emerged later in the twentieth century.<sup>47</sup>

Scrapping or the “reduction of surplus to produce” was the preferred destruction method. It was defined by the process of breaking apart a system of objects that formed a larger “apparatus” in order to salvage the components and materials for reuse or resale.<sup>48</sup> Although scrapping was most profitable with larger weapon systems (such as aircraft or ships), reducing ammunition, explosives, and chemical weapons was a risky business. To scrap ordnance, suitable amounts of time and care were needed, particularly given the dangerous nature of the task. A continuous supply of expert staff was essential for safety and efficiency, while storage facilities and security arrangements were

<sup>45</sup> *SCWEE*, 9 April 1946, (Vol. 2, No. 4), 93-94; *War Assets Corporation Second Annual Report*, 7.

<sup>46</sup> On 18 April 1947 the Royal Navy detonated 6,800 tons of explosives on Heligoland Island. The objective was to destroy the German fortifications, but the island was split in two. The “British Bang” is one of the largest non-nuclear explosions in history.

<sup>47</sup> Donovan Webster, *Aftermath: The Remnants of War* (New York: Pantheon Books, 1996), 11-80, 253-73.

<sup>48</sup> *War Assets Corporation Second Annual Report*, 7.

needed for pre-processed items.<sup>49</sup> Overcoming these challenges meant forestalling the discharge of weapons specialists and the maintenance of demilitarization facilities where shells were boiled (to remove the explosive compounds) and melted down (to recover the metals). Yet within the context of a postwar rush to rapidly retool factories for civilian production and reduce military commitments, the availability of scrapping facilities was not commensurate with the amount of leftover ordnance. Although conventional weapons were reduced with some success by the crown corporation, Canadian Arsenals Ltd., industrial demobilization and the quantities involved conspired to negate widespread feasibility.<sup>50</sup>

The fact that there were several options for destroying surplus ordnance demonstrates that dumping was not a forgone conclusion. However, it was arguably the best alternative. In order to destroy ordnance, a location of deposit and a suitable destruction method are both required. As far as contemporaries were concerned, the efficiency of disposal was determined by how well those two requirements were combined. In other words, disposal was most efficient if the location where ordnance was placed *was* the destruction method. The oceans fit the bill. Disposal at sea obviated the need for costly storage facilities on land and the water formed a security barrier that reduced the risk of recovery.<sup>51</sup> Dumping also offered a means for quickly liquidating bulk quantities. This was important given the destruction of European and Asian transportation networks, the heavy demands on Allied shipping, limited storage space at home, and the worldwide distribution of munitions. Additionally, objects could be thrown overboard as a whole or in parts which limited handling and avoided the need for extensive mutilation. This greatly expedited disposal and ensured it kept pace with demobilization timetables and the reconstruction of the civilian economy.

<sup>49</sup> Ogilvie stressed the importance of having good officers overseeing the cleanup. There was some concern that the three in charge would "leave the Service in the near future." LAC, RG24, Vol. 8070, File: 1270-41, G. Ogilvie to Douglas Abbott, 22 August 1945, 7.

<sup>50</sup> *War Assets Corporation Second Annual Report*, 7.

<sup>51</sup> Recent technological advancements have increased the risk of recovery. Oliver Holmes, "Images reveal three more Japanese WWII shipwrecks torn apart for scrap," *The Guardian*, 9 February 2017 <https://www.theguardian.com/world/2017/feb/09/images-reveal-three-more-japanese-wwii-shipwrecks-torn-apart-for-scrap> (accessed 9 February 2017).

The fact that oceans were conceived of as a place and means for disposal should surprise no one. For much of recorded history, garbage, sewage, and industrial wastes were dumped into the closest lakes, rivers, and oceans without regard for public health or water pollution. As Joel Tarr explained, every process “be it natural, consumer, or production” needs “a sink” for waste and that the “ultimate sink” was the cheapest and most convenient disposal method available.<sup>52</sup> Unfortunately, this meant pumping and dumping waste into the closest waterways. Government officials and scientists in the mid-twentieth century did little to overturn the practice. At the time, a common scientific notion centred on “threshold values” or the idea that there was a safe amount of contamination that could be introduced into the water.<sup>53</sup> Although within the scientific community there were wide opinions on how thresholds were first established and monitored, the vast quantity of water in the oceans was viewed as a tool that could render any pollutants harmless. This enabled a permissive attitude towards dumping and relieved officials of major concerns for the cumulative amount jettisoned at sea. Instead, their focus migrated towards managing the size, locations, and frequency of each dumping operation. In other words, since the water could dilute and diffuse contamination, the key issue devolved to ensuring that the water’s absorption threshold was never overwhelmed by any single dumping operation.<sup>54</sup> Thus, as long as each voyage drowned an acceptable quantity of ordnance at a sufficient depth and distance from the shoreline, dumping could continue indefinitely since no adverse effects on human health were immediately apparent and environmental indicators (such as dead or discoloured fish) could be dismissed as temporary. The time lapse between each dump and the mixing of polluted and non-polluted waters was supposed to eliminate the problem.

When Canadians started dumping ammunition they were far from trailblazers. In fact, Canada was following precedents set after both world wars. Following the Great War, the Allies used

<sup>52</sup> Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, Ohio: The University of Akron Press, 1996), 385.

<sup>53</sup> Jacob Darwin Hamblin, *Poison in the Well: Radioactive Waste in the Oceans at the Dawn of the Nuclear Age*, (Piscataway, NJ: Rutgers University Press, 2009), 10-38, especially 29-38.

<sup>54</sup> Tarr, *The Search for the Ultimate Sink*, 398-403; Hamblin, *Poison in the Well*, 10-38, 41-72.

dumping to dispose of surplus and captured ordnance that could not be disassembled. Throughout the 1920s, conventional and chemical weapons were dumped along the French and British coasts, in the English Channel, and the North and Baltic Seas.<sup>55</sup> A generation later when the Allies occupied the shattered remnants of Germany and Japan in 1945, they immediately initiated demilitarization and disarmament programs to consolidate their power. Right as humanitarian aid trickled into devastated areas, an exodus of weapons, ammunition, scientific equipment, production machinery, and expertise occurred.<sup>56</sup> Yet this precipitated a major pragmatic dilemma: the Allies confiscated a massive array of weaponry, but only a small fraction had any residual scientific or military value, while the remainder posed a major security liability for occupational forces.<sup>57</sup> Allied demobilization compounded this liability by shrinking the size of military forces and materiel requirements. For instance, the British Army—just one branch of the country's armed forces—estimated that it possessed 1.2 million tons of surplus ammunition in the UK alone.<sup>58</sup> In effect, the amount of munitions requiring disposal was larger than just captured enemy weaponry. It included all types of Allied munitions spread across thousands of locations, from small islands in the Pacific to storage magazines on the home front and everywhere in between.

It was in this wider context that Canada's dumping program took shape. As an important but middle-ranked power, Canada

<sup>55</sup> TNA, MUN 4/6046, "Minutes of Proceedings of the Commission Appointed to Examine the Request of Messrs. Pickett & Son to Dump in the Sea from the Port of Dunkerque Gas Shells and other Ammunition," 1 June 1921, 1-6. See also: Thomas Stock and Karlheinz Lohs, eds., *The Challenge of Old Chemical Munitions and Toxic Armament Wastes*. Chemical & Biological Warfare Studies No. 16, Stockholm International Peace Research Institute (Oxford: Oxford University Press, 1997).

<sup>56</sup> For example, see: Annie Jacobsen, *Operation Paperclip: The Secret Intelligence Program that Brought Nazi Scientists to America* (New York: Little, Brown, & Company, 2014).

<sup>57</sup> By November 1945, the American Sixth Army was dumping 4,500 tons every day in Japanese coastal waters. Supreme Allied Commander for the Pacific, *Reports of General MacArthur: MacArthur in Japan: The Occupation: Military Phase*, Vol. 1 Supplement, Reprint (Washington, D.C.: Center for Military History, 1994), 136. See also: H. Lindsey Arison III, *European Disposal Operations: The Sea Disposal of Chemical Weapons* (No Publisher, 2013).

<sup>58</sup> *Beaufort's Dyke Background* (London: Ministry of Defence, no date), paragraph 3; *Beaufort's Dyke Dumping Ground* (London: Ministry of Defence, no date), paragraph 4.

had no formal occupation zone in Germany, although the Army participated in British occupation duties in the Netherlands and Emden-Wilhelmshaven area in northwest Germany. Over the summer of 1945, and despite protests from the Dutch government, Canadian soldiers collected and incinerated large amounts of German weaponry and other confiscated items.<sup>59</sup> They also dumped enemy munitions into the North Sea. In late July, Major Frank Swanson, a correspondent for the *Hamilton Spectator*, reported that “the last and biggest ammunition dumping program of the Canadian army is underway...It will see six million tons of enemy ammunition consigned to the depths of the North Sea under fathoms of salt water.”<sup>60</sup> In reality though, Canada’s contributions to German disarmament were a drop in the bucket compared to what the Americans, British, and Russians dumped into the Baltic Sea. Scientists now estimate that a combination of saltwater corrosion and water currents have spread rusting bombs over perhaps one-third of the Baltic’s seabed and underwater explosions are now large enough that seismic instruments frequently detect them.<sup>61</sup>

The main element of Canada’s dumping program was located on the country’s Pacific and Atlantic coasts, where thousands of tons of weapons and ammunition were sunk. Over the summer of 1945, Canadian military authorities designed the future scope of operations and the first task was identifying suitable dump sites. When selecting potential locations, they sought input from provincial governments and companies operating undersea cables. In late June, a list of sites was circulated to cable companies and the provincial departments of fisheries bordering the St. Lawrence. Most replies were favourable. The Halifax and Bermuda Cable Company did not foresee any

<sup>59</sup> For complaints about the destruction of weapons and civilian goods, see: LAC, RG25 Department of External Affairs fonds, Vol. 3732, File: 5979-G-40, Letter to The Secretary of State for External Affairs, 19 July 1945, 1-2; Pierre Dupuy (Ambassador to the Netherlands) to Secretary of State for External Affairs, 2 August 1945, 1; and “re: Disposal of Enemy Material in Holland,” A. Ross to N. A. Robertson, 5 August 1945, 1-2.

<sup>60</sup> Frank Swanson, “Dump into Sea Hun Ammunition,” *Hamilton Spectator*, 21 July 1945.

<sup>61</sup> Axel Bojanowski, “World War II Munitions Dumps: A Rusting Time Bomb in the Baltic,” *Spiegel Online*, 4 April 2007, <http://www.spiegel.de/international/europe/world-war-ii-munitions-dumps-a-rusting-timebomb-in-the-baltic-a-475520.html> (accessed 22 March 2015); G. Ford, L. Ottemoller, and B. Baptie, *Analysis of Explosions in the BGS Seismic Database in the Area of Beaufort’s Dyke, 1992-2004* (British Geological Survey: Seismology & Geomagnetism Programme, 2005), 1-15.

problems and viewed the proposed locations "as being normally safe as far as our cables are concerned" and its officials had "no reason to anticipate any break in communication from such activity."<sup>62</sup> However, a few changes were suggested by Western Union because the proposed dump sites were too close to their cables.<sup>63</sup> Although one might expect an input from the provincial governments, both the fisheries departments in Quebec and Nova Scotia quickly agreed to the plans.<sup>64</sup>

In one form or another, ammunition dumping received approval from provincial and federal officials, fisheries departments, military authorities, scientists, corporations, and journalists. It appears that few policymakers considered contacting fishermen or coastal communities bordering dump sites. This may have been a conscious attempt to silence sources of opposition and negative publicity, though it is doubtful that any dissenting opinions would have raised doubts about the necessity of dumping. Concerns over the long-term environmental impact of corroded shells were simply washed away. In fact, the only environmental concern appearing in this correspondence was the short-term risk of accidental explosions and the danger this posed to the supply of salmon in the area. As one undated message from the Naval Officer In-Charge (NOIC) of Quebec explained to his counterpart in Cape Breton: "Provincial Deputy Minister of Fisheries concurs in proposed area for dumping ammunition provided there will be no explosions during dumping as for next 6 weeks to 2 months salmon run from Gaspé Peninsula to North Shore will be on."<sup>65</sup>

On 14 September 1945 a confidential memorandum to the Secretary of the Naval Board approved three areas for dumping on the country's Atlantic coast:

- 1) Off Halifax, NS

Within a radius of (5) nautical miles from a position bearing 116° and distant forty (40) nautical miles from Chebucto Head Lighthouse. (Approximate location Latitude 44° 12' N, Longitude 62° 42' W)

<sup>62</sup> LAC, RG24, Vol. 11121, File: 70-2-6 Vol. 1, Manager Halifax Branch to Vice-Admiral G. C. Jones, 21 June 1945.

<sup>63</sup> Ibid, W. Adamson (Western Union) to Vice-Admiral G. C. Jones, 20 June 1945.

<sup>64</sup> Ibid, Arthur Labrie to Commander F. B. Latchmore, 4 July 1945.

<sup>65</sup> Ibid, "Naval Message," NOIC Quebec to NOIC Sydney, June 1945.



2) Off Sydney, NS

Within a radius of five (5) nautical miles from Latitude 46° 19' N, Longitude 58° 39' W.

3) St. Lawrence

Within an area bounded as follows: Southern Limit, Latitude 49° 30'N. Western and Northern Limit, the 100 fathom contour line bordering the North Shore of the St. Lawrence. Eastern Limit: Longitude 65° 30'W.<sup>66</sup>

Following these orders dumping operations steadily increased, particularly at the Emerald Basin, the first location identified above and the place where the bulk of damaged shells were thrown during the Bedford cleanup. According to an internal report, from 18 July to 1 October 1945 approximately 2,200 tons of ammunition from Bedford was dumped in the vicinity of the Emerald Basin.<sup>67</sup>

Following the establishment of designated dump sites, naval authorities ordered all depots to forward lists of stores dumped over the summer. These lists are some of the only surviving evidence detailing what was discarded at sea. In combination with the related correspondence, they also provide coordinates where some dumping took place. Inventories were submitted to naval headquarters from Levis, Quebec, St. John, New Brunswick, and Sydney, Nova Scotia (as well as other naval bases though these lists have not survived). The NOIC at St. John reported the smallest totals; only 181 projectiles in unserviceable condition were dumped at sea.<sup>68</sup> The NOIC at Levis explained that only one ship, HMCS *St. Pierre*, was dumping munitions, but it had jettisoned roughly 40,000 different projectiles into the St. Lawrence at locations near the third designated site. These included 12,406 cartridges of 20mm Oerlikon high explosive (HE) rounds, 4,944 cartridges of 40mm Bofors HE (with fuzes), 300

<sup>66</sup> LAC, RG24, Vol. 34394, File: 5130-1, "Confidential – Memorandum to Secretary – Naval Board," Captain R.W. Wood, 14 September 1945.

<sup>67</sup> "Events Leading Up to the 1945 Explosion," 24.

<sup>68</sup> The items included depth charges, hedgehogs, rockets, and 4" shells. LAC, RG24, Vol. 11121, File: 70-2-6 Vol. 1, "Naval Message" NOIC St. John to Naval Service Headquarters, no date.

depth charges, and several dozen primers and fuzes.<sup>69</sup> Unfortunately, because of Ogilvie's orders the depots at Dartmouth and Bedford did not maintain any lists, as the NOICs stated that "no record of explosive stores jettisoned by ships" was available. However, they did suggest that each ship's armament ledger could be consulted instead.<sup>70</sup>

By far the largest inventory of dumped stores came from the NOIC at Sydney. This is not surprising given that the Bedford Explosion forced the Navy to adjust the locations where it demobilized its vessels. At the time of the Bedford Explosion, de-storing operations were well-underway at Sydney, Shelburne, and St. John's, Newfoundland. Between 7 June and 6 July 1945, forty-eight ships offloaded ammunition in Sydney. These numbers only continued to increase after Bedford's storage facilities were destroyed.<sup>71</sup> De-ammunitioning a naval vessel involved the removal of all ordnance from the ship's magazines to a facility on land. In practice this meant that personnel removed all the ordnance that the Navy wanted to keep and instructed the skeleton crew to dump the stores while on route to the WAC's main ship graveyard at Sorel, Quebec. It was at Sorel where vessels were decommissioned and stored until the WAC sold them off.<sup>72</sup>

The Bedford Explosion greatly influenced the geography of Canada's dumping program and ensured that large stores were jettisoned around Cape Breton, south of Newfoundland, and all the way up the St. Lawrence to Montreal. The Sydney inventory detailed all items dumped from May until September 1945. According to the list, 522,972 objects were tossed into the ocean. This included 252,658 cartridges of .303-inch small arms ammunition, 101,729 cartridges of 20mm Oerlikon rounds, 19,992 cartridges of 2-pounder quick firing artillery shells, 2,305 depth charges, and thousands of other projectiles divided into fifty-three different categories of types

<sup>69</sup> Ibid, Memorandum, Lt. E. Rogers Sriver (NOIC Levis, Quebec) to Commanding Officer Atlantic Coast, 15 September 1945.

<sup>70</sup> Ibid, "Naval Message," Supt. Naval Armament Depot (Dartmouth) to Naval Service Headquarters, no date.

<sup>71</sup> LAC, RG24, Vol. 11686, File: CSS 1-2-2, "Memorandum: General Activities Sydney Sub-Command," A/Captain J. McCulloch (NOIC Sydney) to H. M. C. Dockyard, 6 July 1945, 1-2.

<sup>72</sup> Directorate of History and Heritage (DHH), 81/5200/8000-8000, Box 242, File: 10, "Statement on War Assets Corporation Operations in the Disposal of Marine Craft," by John Berry, 7 May 1946, 1-11.

and calibers.<sup>73</sup> The early intensity of dumping operations is quite striking considering that most of these items were dumped when postwar requirements were still in flux and war with Japan loomed ahead. However, once hostilities ended in the Pacific and postwar budgets were confirmed, the totals continued to increase.

By the end of September 1945 drowning munitions was a standard practice of the peacetime military. Naval headquarters started tracking operations through weekly summaries, rather than requesting reports after the fact. Unfortunately, as the archival record is incomplete, it is unclear for how long these summaries were used.<sup>74</sup> However, the summaries for the weeks ending 29 September and 6 October suggest a general pattern. According to these documents dumping was a daily occurrence unless adverse weather kept ships in port. For the week ending on 29 September “an estimated 550 tons of ammunition” was dumped. The following week, inclement weather limited operations to just 350 tons.<sup>75</sup> Tables 2 and 3 list the types and quantities dumped off the Atlantic coast over this two-week period. Additionally, another summary that divided total tonnage by ship gives some indication about how much was sunk per day. Along Canada’s eastern coast, every vessel assigned “dumping duties” carried about 30-35 tons daily.<sup>76</sup> However, there were days that departed from this average: HMCS *Poundmaker* dumped 44 tons on 10 October, while HMCS *Buckingham* and *Victoriaville* dumped 55 tons and 19 tons respectively on 13 October.<sup>77</sup> The Navy made good use of Old Davy Jones’ Locker.

<sup>73</sup> LAC, RG24, Vol. 11121, File: 70-2-6, “Explosive Stores Jettisoned,” A/Captain J. McCulloch to Commanding Officer Atlantic Coast, 19 September 1945, 1-3.

<sup>74</sup> The lack of documentation is common in all countries. William Brankoqitz, *Chemical Weapons Movement: History Compilation* (Aberdeen Proving Ground, MD: Official of the Program Manager for Chemical Munitions, 27 April 1987), 1; *Beaufort’s Dyke Background*, paragraph 7 and 14; Peter G. Brewer and Noriko Nakayama, “What Lies Beneath: A Plea for Complete Information,” *Environmental Science & Technology* (March, 2008), 1394-99.

<sup>75</sup> LAC, RG24, Vol. 11121, File: 70-2-6 Vol. 1, “Disposal of Ammunition, Report for Week Ending 29 September 1945,” Supt. Naval Armament Depot (Dartmouth) to Commanding Officer Atlantic Coast, 3 October 1945.

<sup>76</sup> About ten ships were tasked with dumping. For a partial list, see: LAC, RG24, Vol. 11684, Naval Message, n. d.

<sup>77</sup> LAC, RG24, Vol. 11121, File: 70-2-6 Vol. 1, “Disposal of Ammunition, Report for Week Ending 13 October 1945,” Supt. Naval Armament Depot, (Dartmouth) to Commanding Officer Atlantic Coast, 27 October 1945.

Type of Ammunition Dumped	Quantity
<i>Depth Charges, Mk. VII</i>	<i>1,050</i>
<i>Cartridges, Q.F. 4" Mk. XIX</i>	<i>517</i>
<i>Cartridges, 20 MM Oerlikon</i>	<i>49,000</i>
<i>Cartridges, B.L. 4" Full and Reduced Charges</i>	<i>1,456</i>
<i>Cartridges, Q.F. 3" 20 Cwt.</i>	<i>896</i>
<i>Cartridges, Q.F. 2 Pdr. H.E./H.V.</i>	<i>71,512</i>
<i>Cartridges, S.A. 9MM</i>	<i>58,880</i>
<i>Cartridges, .303"</i>	<i>4,000</i>
<i>Shell Q.F. 4.7"</i>	<i>93</i>
<i>Shell, Q.F. 4"</i>	<i>714</i>
<i>Shell, Q.F. 12 pdr. 12 Cwt.</i>	<i>91</i>
<i>Projectiles, 1¾ Hedgehog</i>	<i>1,929</i>
<i>Fuzes, Time No. 198</i>	<i>525</i>
<i>Primers, D/C Mk. VII</i>	<i>170</i>

Table 2: Disposal of Ammunition, Report for Week Ending 29 September 1945. [LAC, RG24, Vol. 11121, File: 70-2-6 Vol. 1, "Disposal of Ammunition, Report for week ending 29 September 1945," Supt. Naval Armament Depot (Dartmouth) to Commanding Officer Atlantic Coast, 3 October 1945.]

The Army and Air Force also operated separate dumping programs. This fact complicates the history of Canada's postwar disposal program, as four organizations (the Army, Air Force, Navy, and WAC) were engaged in dumping, but few documents exist outside of naval records. However, there is some evidence indicating that the Army drowned ammunition in the Great Lakes. On 20 November 1945, James Vipond, a reporter for the *Globe and Mail*, informed readers about the Army's test dump of 150 tons of obsolete ammunition. The ordnance was jettisoned into seventy-eight fathoms of fresh water at Dyer Bay on Lake Huron, two miles from the Bruce Peninsula and several miles north of Owen Sound. The test, performed by the Great Lakes tugboat *Northern*, took several trips to complete and the twelve soldiers accompanying Captain J. M. Seldon threw the explosives overboard by hand. Seldon explained in an interview that it was not possible to salvage any materials from the shells and

Type of Ammunition Dumped	Quantity
<i>Depth Charges, Mk. VII</i>	<i>100</i>
<i>o.Q.F. 2 pdr. H.E./H.V.</i>	<i>89,956</i>
<i>Mine Charge Cases</i>	<i>23</i>
<i>Cartridges, U.S., 3" 50 Cal.</i>	<i>236</i>
<i>Cartridges, S.A., 5" Vickers</i>	<i>196,140</i>
<i>Cartridges, S.A., .30 Cal.</i>	<i>256,139</i>
<i>Shell, Q.F. 4" Mixed</i>	<i>249</i>
<i>Warheads 21" Mk. IV-VB</i>	<i>8</i>
<i>Warheads 21" Mk. II</i>	<i>4</i>
<i>Fuzes, Time No. 198</i>	<i>100</i>

Table 3: Disposal of Ammunition, Report for Week Ending 6 October 1945. [LAC, RG24, Vol. 11121, File: 70-2-6 Vol. 1, "Disposal of Ammunition, Report for week ending 6 October 1945," Supt. Naval Armament Depot (Dartmouth) to Commanding Officer Atlantic Coast, 12 October 1945]

that the ammunition was obsolete since Dunkirk.<sup>78</sup> Apparently this successful test dump paved the way for future operations in Dyer Bay as the Army expected to ship at least 1,000 tons of ammunition from Petawawa to Owen Sound. Adding to the operation's success was the fact that the WAC sold the wooden boxes and metal containers used for storing the ordnance as 10,000 wooden tool boxes and 5,000 boxes for packing fish.<sup>79</sup>

Despite the parallel dumping programs, each branch of the Canadian military cooperated when necessary and dumping became a joint operation. In several documented instances (particularly those involving mustard gas), the inter-service cooperation was essential. When dumping gas, the Army was responsible for the shipping and handling of drums on land, while the Navy provided the vessels, navigation, and "other marine aspects." The WAC covered the financial expenses.<sup>80</sup> By the mid-1950s, the separate programs were merged and the Navy performed all dumping operations which grew to include

<sup>78</sup> James Vipond, "Ancient Ammo Racked in Old Davey's Locker," *Globe and Mail*, 20 November 1945.

<sup>79</sup> Ibid.

<sup>80</sup> "Dump 600 Tons of Mustard Gas into Pacific Later This Month," *Globe and Mail*, 16 September 1947; *War Assets Corporation Third Annual Report*, 26; *War Assets Corporation Fourth Annual Report*, 20.

radioactive waste. Throughout most of the Cold War both sides of the Iron Curtain dumped and discharged radioactive waste into the world's oceans, rivers, and lakes at alarming rates.<sup>81</sup> In Canada, the military's standard disposal procedures directed service personnel to put the radioactive materials in leftover paint cans and encase them in concrete before dumping them into a minimum of 1,000 fathoms of saltwater.<sup>82</sup> One dumping operation in 1960 jettisoned 24,930 lbs. of "radioactive tubes" along with 2,783 lbs. of fuzes and 43,039 lbs. of "miscellaneous ammunition" at an undisclosed location off the Pacific coast.<sup>83</sup> A year later, the Navy dumped a minimum of 15,512 lbs. of "radioactive materials" (along with 130,885 lbs. of conventional munitions) into the Atlantic and Pacific Oceans.<sup>84</sup>

For the most part, dumping took place in the general vicinities of the sites identified by Captain Wood's September memo. But it is foolish to assume that all ordnance wound up on the seafloor in perfect piles at the right locations. At the time, dumping was far from an exact science and its implementation was replete with many serious challenges and obstacles. On any given day, dumping operations were handicapped by imprecise navigational technologies, bad weather, and rough seas which put vessels off course and sometimes far away from designated locations. Moreover, it was not uncommon for crews to jettison ordnance before their ship even reached the authorized dumping areas. An early start was preferred by ship captains leery of navigating at night and private contractors worried about paying costly overtime charges because of navigational and weather delays. Even if ships reached the designated locations, it took hours for crews to offload everything while the ship stayed in constant motion. Therefore, the radius of 5 nautical miles identified by Wood was easily

<sup>81</sup> For more information, see: Jacob Darwin Hamblin, *Poison in the Well: Radioactive Waste in the Oceans at the Dawn of the Nuclear Age* (Piscataway, NJ: Rutgers University Press, 2009).

<sup>82</sup> LAC, RG24, Vol. 34395, File: 5130-1 Vol. 6, "Drowning of Explosives (RCAF), West Coast," Naval Secretary to Commodore Superintendent Pacific Coast, 21 March 1960.

<sup>83</sup> Ibid, "Drowning of Explosives (RCAF), West Coast," Naval Secretary to Commodore Superintendent Pacific Coast, 11 April 1960.

<sup>84</sup> LAC, RG24, Vol. 34395, File: 5130-1 Vol. 7, "Ammunition and Radio Active Materials, Disposal by Drowning," K. W. Walton to Chief of Naval Staff, 13 June 1961, 1-2.



Photo 5: On arrival at the ammunition dumping ground off Cairnryan, members of the Royal Army Ordnance Corps place shells on gravity rollers that take the ammunition over the side of the ship and into the sea. [Image © IWM (H 42208)]

traversed and the cargo was dispersed over a wider and unrecorded area.<sup>85</sup>

The physical act of dumping introduced further difficulties. Photographic evidence provides some indications about how dumping took place. Unfortunately, there are no known pictures of Canadian dumping operations in action, but the military did not invent any new techniques and therefore American and British photos are likely representative of Canadian practices. In the 1940s, dumping was a labour-intensive and time-consuming process. Loose munitions were always dumped one at a time by hand in order to limit bumping, sparks, mid-air collisions, and accidental explosions. Photo 5 shows British soldiers from the Royal Army Ordnance Corps stationed out of Cairnryan using “special gravity rollers” when dumping ordnance

<sup>85</sup> LAC, RG24, Vol. 11121, File: 70-2-6 Vol. 1, “Disposal of Ammunition, Report for week ending 6 October 1945,” Supt. Naval Armament Depot (Dartmouth) to Commanding Officer Atlantic Coast, 3 October 1945.

in Beaufort's Dyke, the UK's largest disposal site.<sup>86</sup> Sometimes personnel, like the soldier in the background, would simply resort to heaving shells as far as they could from the ship's deck.

The utility of gravity rollers doubled when dumping heavier items, such as crated ordnance or larger caliber shells. However, this activity was dangerous for the inattentive worker whose clothing or extremities were liable to get caught in a crate's riggings. At least one fatality occurred in this manner onboard HMCS *Eastore*. On 9 October 1947, a civilian contractor named B. J. Pothier drowned when his hand got trapped in a crate's handle before it rolled overboard. The heavy crate sunk like an anchor and Pothier's body was never recovered.<sup>87</sup> Besides gravity rollers, there was one other dumping technique commonly used. This other method involved loading a surplus Landing Ship Tank (LST) in port with ordnance and then scuttling it at a designated location. This practice mitigated the risks to weapon specialists and was used extensively for bulk quantities of chemical weapons or dangerously degraded ammunition.<sup>88</sup>

The challenges of dumping are illustrated by one operation that took place in February 1946 near Sable Island. The debacle, recounted in DND records and by John Bryden in *Deadly Allies*, developed into a series of errors as nothing went according to plan and changes were improvised on the fly.<sup>89</sup> On 18 February, LST No. 209 was loaded with about 2,000 tons of mustard gas and towed out to sea by two tugboats hired from a private firm in Halifax called Foundation Maritime. The two tugs and LST 209 were accompanied by a naval escort, the minesweeper HMCS *Middlesex*, and an old army supply ship, HMCS *General Drury*, carrying members of the local press, the Army's disposal officer, and the WAC supervisor. While on route, the convoy hit a winter gale that threw them off course and prevented a scuttling party (provided by a Montreal-based private contractor Hayes, Stuart, and Coy Ltd.) from boarding the ship. The original plan was to use depth charges to sink the LST, but when it was discovered that 100 drums of mustard gas were stowed on the

<sup>86</sup> *Beaufort's Dyke Dumping Ground*, paragraph 17.

<sup>87</sup> Wright, *The Other Halifax Explosion*, Chapter 9, 5.

<sup>88</sup> *Report on Sea Dumping of Chemical Weapons by the United Kingdom in the Skagerrak Waters Post World War Two* (London: Ministry of Defence, no date), 1-4.

<sup>89</sup> John Bryden, *Deadly Allies: Canada's Secret War, 1937-1947* (Toronto: McClelland & Stewart, 1989), 11-13.



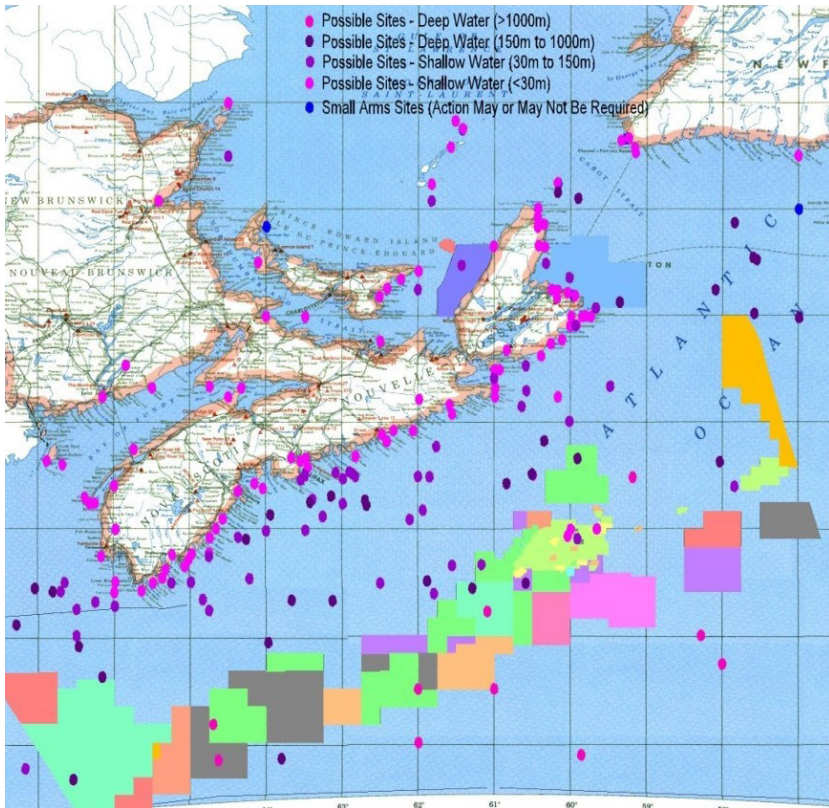
main deck and not in the cargo hold, the plan was nixed. At dusk when the weather cleared, the scuttling party boarded the LST but botched the job when they “neglected to open the after sea cocks.” As a result, the “hulk settled very slowly and was only half submerged at daylight the following day.”<sup>90</sup> At this point, the *Middlesex* was ordered to “holed the after end [of the LST] with Oerlikon fire.” After expending 400 rounds, the LST finally sank in water 1,000 fathoms deep and “200 miles from Halifax and 60 miles South and South East of Sable Island.”<sup>91</sup> Several of the drums were observed floating around the dump site afterwards and rifle fire from 50–70 yards was used to sink them. Indeed, dumping could be dangerous, improvised, and occur far away from any sanctioned locations.

The imperfect techniques, combined with navigational limitations and the strength of ocean currents, multiplied the number of locations where munitions settled on the seafloor. Consequently, it is difficult to estimate the total number of dump sites in Canadian waters. According to Terrence Long, the Chairman of the International Dialogue on Underwater Munitions (IDUM), there are some 3,000 dump sites along Canada’s Atlantic coast alone, while the DND recognizes only a fraction of his assessment (See Map).<sup>92</sup> Unfortunately, the real number will likely remain a mystery given the fragmentary nature of relevant archival collections, the lack of public transparency and engagement, and the limited amount of available research funding. However, such divergent estimates about the scale and scope of Canada’s dumping program are indicative of the need for closer collaboration between governments, researchers, and other stakeholders. Definitions about what exactly constitutes a dump site need to be firmly established so that funds can be directed towards site surveys, ordnance identification, and risk assessments for both human health and offshore economic developments.

<sup>90</sup> LAC, RG24, Vol. 8060, File: 1240-15 Vol. 1, “Report of Proceedings, Scuttling Hulk LST 209 Loaded with Mustard Gas,” Lt. Cdr. B. P. Young to Commanding Officer HMCS Scotian, 21 February 1946, 1-2.

<sup>91</sup> Ibid, and “Disposal of Mustard Gas,” Brigadier H. J. B. Keating to C. N. S. 7 February 1946; Bryden, *Deadly Allies*, 11-13.

<sup>92</sup> For a list of “legacy” UXO sites, see <http://www.forces.gc.ca/en/business-unexploded-ordnance/uxo-sites.page> (accessed 10 September 2016).



Map of possible dump sites around Nova Scotia. The coloured blocks are areas identified for oil and gas exploration and development (2003). [Image courtesy of Terrance P. Long, Chair of the International Dialogue on Underwater Munitions (IDUM)]

### THE ENVIRONMENTAL LEGACY OF DISARMAMENT

Wherever Allied armies fought, the tyranny of distance was conquered before the enemy was defeated. The vast bodies of water separating the war front from the industrial front posed the greatest geographic and logistical obstacles to victory. However, in peace, they became the ideal places for discarding the detritus of war. In retrospect, the dumping of munitions might appear today like some immoral transgression and that the Allies carelessly perpetrated an environmental disaster in disarming themselves and their enemies. No doubt there is some truth to that assertion, but the objective here was not to debate the morality of dumping within the context of today's growing environmental concerns. Instead, the objective

was to understand why and how ocean dumping became a widely-used disposal method for conventional and chemical munitions.

The decision to dump munitions was conditioned by many factors and variables, which included: historical and international precedents, quantities and types, speed and efficiency, capacity and distribution, financial costs, public safety, the security of occupation forces, and, perhaps most pressing of all, freeing storage space at ammunition depots. As one DND official wrote to Captain M. A. Medland, Wood's successor as Director of Naval Ordnance, in May 1946, "it is intended to dump all surplus imperial stocks of ammunition and explosives stores held at [Royal Canadian Naval Armament Depots] so that further stowage space which is urgently required may be made available at an early date."<sup>93</sup> At the time, policy making and implementation were constrained by the physical, financial, pragmatic, and spatial realities of a demobilizing military and government bureaucracy. The over-riding priority was to divest assets quickly. There were simply few concerns about the corrosive powers of saltwater or the long-term ecological consequences of releasing large amounts of chemicals, acids, heavy metals, and carcinogens into marine environments and, possibly, the food chain. In the end, this short-sighted disarmament strategy has left a potentially devastating legacy. As time goes on and corrosion continues, these tools of death and destruction will slowly return to endanger another generation.

♦ ♦ ♦ ♦

#### ABOUT THE AUTHOR

**Alex Souchen** is a SSHRC Postdoctoral Fellow at the Laurier Centre for Military Strategic and Disarmament Studies and earned his PhD at Western University in 2016. His research explores the history of munitions disposal, war junk, and postwar reconstruction after the Second World War. Follow him on Twitter: @AlexSouchen.

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<sup>93</sup> LAC, RG24, Vol. 34394, File: 5130-2, "Memorandum for the CNAS," E. H. Russell to M.A. Medland, 4 May 1946.