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SUBMARINE ACQUISITION IN THE RCN:  
FROM NUCLEAR TO CONVENTIONAL, 1955-65

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## Introduction

During the years from 1955 to 1965 the topics, for the RCN, of submarines and nuclear propulsion were intertwined, although this did not always imply an interest in nuclear submarines. Thus, in 1953, Naval Staff became concerned to improve submarine availability for anti-submarine warfare training. Shortly thereafter, but separately, Naval Board at the prompting of the Chief of Naval Technical Services (CNTS) called for an investigation of "the practical application of nuclear fuel in warship propulsion plants." Little was accomplished, however, until the fortuitous arrival of (then) Commodore (E) B.R. Spencer as Deputy/CNTS (in October 1955) and as Engineer in Chief (August 1956). This kind and gentle officer, a devout Christian and somewhat given to prayer even in official meetings, had served during his training in the Royal Navy's coal-fired EMPEROR OF INDIA. He saw, in himself, a potential link between ancient and modern marine propulsion and pursued this aspiration with quiet determination.

His initial paper, "Appreciation of the Use of Nuclear Propulsion in the RCN," concluded that technical branches were lacking in knowledge of this field and that Atomic Energy of Canada's (AECL) reactor would be unsuitable for marine propulsion.<sup>1</sup> Assistance from the USN or from Admiralty would therefore be required--and the former was not permissible under the US/Canada Bilateral Agreement of June 1955.<sup>2</sup> Accordingly, Spencer, motivated perhaps by his own RN training, proposed to try and join with the British in establishing a joint team to develop nuclear machinery for naval propulsion, preferably as "equal partners." To this end it was proposed to send a Canadian Naval Engineer to join the Admiralty team at the British Atomic Energy Research Establishment at Harwell and to enroll

another in the USN's post-graduate course in Nuclear Engineering at the Massachusetts Institute of Technology. In the ensuing months, Spencer wrote frequent memoranda urging this form of propulsion, even for small warships. Gradually, support began to develop for Spencer's proposal, not insignificantly from the dynamic Naval Constructor in Chief (NCC), Constructor Commodore R. Baker, an officer on loan from the Royal Corps of Naval Constructors who was later (as Sir Rowland Baker) to head the RN's Nuclear Submarine Project. With not-untypical hyperbole he asserted:<sup>3</sup>

with nuclear power it will always be possible to build a nuclear surface ship (for less cost) that can out-perform the submarine [and that] the RCN as an A/S Force must go nuclear or GO.

As well, AECL expressed themselves willing to cooperate.

It now became evident that the RN was to embark on building nuclear submarines but that, as well, they had initiated "a feasibility study on the application of nuclear power for surface vessels."<sup>4</sup> Spencer now engaged in a flurry of exhortations--to CNTS, to the RNC's Policy and Projects Coordinating Committee (PPCC) and to Naval Board, calling for the establishment of a Study Team with members from the RCN, AECL, and Defence Research Board, for a lengthy investigation "to determine whether present reactor and associated machinery design is suitable to A/S propulsion..."<sup>5</sup> Naval Board agreed to this "in principle" noting that:<sup>6</sup>

as far as is known, the application to the Destroyer Escort class of ships has not yet been studied by the USA or by Great Britain.

Implementation of the study would be considered subsequently, after discussions with AECL and DRB. Thus, by the end of 1956, it appeared that there was an intent for a unilateral Canadian approach to nuclear propulsion in an A/S vessel, although, no doubt, bearing the hope that cooperation would develop with the USN and the RN. This endeavour--simply

to mount a study--had demanded more than a year of persistent effort, primarily by Cmdre. Spencer himself.

At the beginning of 1957 however, events took a different turn when it appeared that some Canadian participation would be welcomed by Admiralty and, early in January, a formal request was received for Canadian involvement at Harwell. In response a team, including Spencer himself with AECL and Defence Research Board (DRB) representatives, visited a variety of appropriate nuclear establishments in the UK during April and, by July, Ministerial approval had been obtained for a Canadian element to participate in a study relating to the development of a reactor using natural (or slightly enriched) uranium and probably suitable for a fast medium-sized tanker. This attachment began in November.

#### Consideration of Nuclear Submarines

Meanwhile, the Naval Staff were reviewing the acquisition of nuclear submarines (a much more sophisticated endeavour than that being contemplated by Technical Services) and produced a report advising that these were essential for A/S effectiveness and concluding (apparently without any technical input) that:<sup>7</sup>

These submarines can be built in Canada and construction should commence in 1960-61...to meet the requirements for an effective ship replacement program.

Thus, there was some variance in the desire for nuclear propulsion--for a tanker, on the one hand, and for nuclear submarines on the other. Fortunately, this was fairly quickly resolved, for Spencer, visiting the UK in March 1958, concluded that there was little benefit in continuing with the Admiralty study, since it did not appear to have relevance to the RCN's

current needs.<sup>8</sup> Thus Naval Staff and Naval Technical Services could unite in a series of proposals, which led to a comprehensive set of decisions by Naval Board in April 1958.<sup>9</sup> These included agreement

- to the requirement for nuclear propelled A/S submarines in the RCN;
- to negotiate with USN "to enter into an exchange of nuclear reactor information and to establish a programme defining the scope and means of exchange";
- for a feasibility study to determine if nuclear propulsion plants, components and equipment can be manufactured in Canada and at what costs, lead time, and production rates;
- that AECL be requested to conduct the study with the assistance of an RCN Team;
- that NCC conduct a study to determine whether the submarine hulls could be built in Canada;
- that Assistant Chief of Naval Staff (Plans) (ACNS[P]) conduct a study to determine the logistic support implications.

Thus the path towards nuclear submarines had now been taken, albeit with the apparent intent for a plethora of studies so that Naval Board did not consider the matter again for nearly a year (i.e., in March 1959). Meanwhile, and most usefully, Spencer was promoted to Rear Admiral and became Chief of Naval Technical Services in September 1958.

At this point it became necessary to consider what kind of nuclear submarine to study and, since Admiralty were only in the preliminary stages of developing HMS DREADNOUGHT (with an American reactor), the choice had to be a USN submarine about which there was very little information available, due to the very close control exercised by Adm. Rickover. From published

information, therefore, it seemed clear the optimum choice would be the nuclear propelled SKIPJACK, the first to have the "tear-drop" hull form developed in the conventionally powered ALBACORE. Accordingly, Chairman Chiefs of Staff requested the Canadian Joint Staff in Washington to obtain appropriate data and, somewhat optimistically,<sup>10</sup> went on to note that the RCN intended to seek an amendment to the US-Canada Civil Agreement for Cooperation concerning Civil Uses of Atomic Energy that would extend its application to nuclear power plants for submarines.

Meanwhile, RAdm. Spencer had been negotiating (the term "wheeling and dealing" might be used to apply to a lesser man) with regard to Board's awkward proposal for three separate but concurrent studies. Eventually it was accepted that these should be consolidated into one study (by a Nuclear Submarine Survey Team) as an integrated endeavour. Part of the bargaining seems to have required that it be headed by a Constructor Captain, and since I could be made available (although not without some heart-searching, given that I had already been selected to attend the National Defence College) this was the way things turned out.<sup>11</sup> Accordingly, the Team was established in June 1958 with an obligation to report in twelve months. Since, in effect, the members could not come together until early September, I was sent off to England to take the Harwell Senior Technical Executives Course and to visit UK nuclear and submarine facilities. (While not directly relevant to US construction, those visits had the merit of being readily arranged and my own status as an earlier member of the Royal Corps of Naval Constructors may have helped.)

### The Work of the Nuclear Submarine Survey Team

It has to be acknowledged that, at the outset, the Nuclear Submarine Survey Team (NSST) was a somewhat little known (or appreciated) entity, well outside the normal range of affairs and initially cut off from communication networks. To his credit, however, RAdm. Spencer did include me in the weekly meetings of the Technical Services Council. As well, at the outset we were in somewhat of an intellectual vacuum and (as always in these circumstances) set out to develop an accepted set of Terms of Reference (Annex I).

It was clear that a major task would be to assess the capabilities of the various Canadian shipbuilders and machinery contractors who might wish to be involved in a building project. Here we were fortunate for, in spite of the various restrictions, we were able to make (somewhat circumscribed) visits in the U.S., to Portsmouth Naval Shipyard, the base, at that time, for the USN's nuclear submarines; and also to the Electric Boat Company, at that period the only builder of nuclear submarines. These visits, and our own combined experience, emphasized to us that we must have a concern not only for the essential facilities required but, as well, must form some opinions about the key individuals who might be involved with the project and the way in which they would set about resolving their demanding problems. Thus, with some measure of intuition and conjecture, we compiled a set of key issues and requirements that would face those seeking to build nuclear submarines and their machinery. Armed with these we then began a series of visits to appropriate establishments seeking to brief them on the problems to be faced and indicating the sort of information and assurances we would require. Key points for shipyards would be general yard facilities and depths of water, together with a need for heated and



enclosed building berths, as well as an ability for handling heavy plates and large sub-units. Nuclear considerations would, somewhat unusually, demand "clean" areas for pipe and equipment fabrication and with means for decontamination. As well, and more generally, there would be a concern for geographic location and for consideration of nuclear safety.

For engineering contractors, the situation was rather different. Initially we sought to determine whether (or to what extent) they could undertake the whole endeavour, or whether they would have to be satisfied with the manufacture of certain components.

Needless to say the firms involved (or those who, at any event, had a significant interest) used their own informed contacts so that our visits provided a mutual learning experience. Both sides recognized the need for some flexibility of approach and accepted the need for a significant enhancement of managerial competence and numbers.

There was a gratifying response, all the yards involved with the destroyer escort program expressing an interest. For our part, however, we were firmly of the opinion that such a program would have to be accomplished in only one yard (or at most two). Thus, on the basis of first impressions we set up a list of criteria, appropriately weighted, made our numerical judgments, argued over our diverging views and eventually came to a judgment with regard to the selection of contractors. This was then set aside for subsequent review as more information became available.

So, as 1958 drew to a close, we began to get a grasp of the problem. We had visited the relevant Canadian establishments, made initial proposals with regard to Finance, Training, and Nuclear Safety, and suggested a

suitable Headquarters Organization to deal with nuclear acquisition. Nevertheless, we still did not have adequate access to USN nuclear data and concluded our year-end review with somewhat gloomy prognostications:<sup>12</sup>

There can be no doubt that the delays which have ensued will reduce the time which can be spent on developing the report...However, it is determined that a report will be issued by June 30th even though it may be less definitive in certain aspects than had been originally planned.

Nevertheless, all was soon to change.

#### Negotiations with the United States

We recognized, very clearly, that the intricacies of nuclear propulsion were an enigma carefully guarded by the brooding Admiral Hyman Rickover. And to gain access to this tightly closed coterie would demand considerable authority--in fact, an appropriate amendment to the US-Canada Civil Agreement for Cooperation concerning Civil Uses of Atomic Energy. To this end (presumably after a measure of diplomatic negotiation) a team from DND flew to Washington early in January 1959. However the key performer was clearly Mr. J.L. Gray, head of AECL, who was dealing with his opposite number from the US Atomic Energy Commission. An agreement was achieved by mid January, which defined the "Means and Extent" of discussions that would let us get at matters of construction and operation, training, contractual arrangements, etc. and (particularly) to undertake appropriate visits. The relevant portion of this Agreement is included as Annex II and it will be noted that its original extent was only to 1 June 1959.

This, at any event, permitted us to make a number of visits--to the USN's nuclear organizations and, again but more extensively, to the Portsmouth Naval Shipyard and the Electric Boat Company. Since it was easy to be impressed (indeed, difficult not to be over-awed and intimidated) by

the care, complexity and expense of the arrangements adopted, we also visited the Ingalls Shipbuilding Company at Pascagoula, Mississippi, which was just starting to build nuclear boats. Here, in delightful southern surroundings we found a more sympathetic understanding, and a clearer comprehension of the problems to be faced. These visits convinced us, from their "real-life" perceptions, that building nuclear submarines was not a matter of "business as usual"--certainly not shipbuilding as usual. While we might not wish to move to the unusual and tightly controlled complexities of organization adopted by the USN, it was clear that technical integration, inspection, quality control, cleanliness (of an anti-septic order), scheduled procurement, expediting, and the development of the highest standards of marksmanship were going to be essential. And these cheerful sentiments we passed on to the Canadian Shipbuilders.

With regard to machinery contractors in Canada, it was now clear that from considerations of time and cost the sophisticated and novel machinery, primarily the nuclear plant itself, would have to be procured from the US--although ultimately it was hoped that a growing proportion could be manufactured in Canada. What was needed, however, was a Canadian "Prime Machinery Contractor" that could coordinate the procurement and production of the main propulsion plant and its associated equipment, as well as bear engineering responsibility for system analysis, performance assessment, and manufacturing concessions (if any). These obligations would call for a professional and managerial qualifications of a high order.

Meanwhile, there was a certain restiveness in high places, due to the passage of time, for a Progress Report. CNTS resisted this,<sup>13</sup> only to be somewhat testily rebuffed by the Vice Chief of Naval Staff (VCNS), RAdm.

E.P. Tisdall, who noted:

All that is required is an interim paper which should be in the nature of a progress report so that CNS and I can have an early indication that the NSST is achieving anything.

Perhaps in light of this doubt about NSST's competence the Progress Report surprisingly appeared as a Staff document<sup>14</sup> although, in fact, the bulk of it was prepared by NSST.

#### Conclusions of the NSST

With a boldness that, perhaps, we did not share, DNPO observed, exhibiting the typical confidence of Naval officers in difficult or obscure situations, that

the general information available has been sufficient to reach broad conclusions in respect of feasibility and cost. It is unlikely that any further information will materially affect these broad conclusions.

(In essence this statement turned out to be accurate.)

We thus asserted that:

- SSNs could be built in Canadian yards (albeit after significant improvement to the latter) and with a building time of 4 to 4-1/2 years, compared with the contemporary US time of about 3 years;
- there were three industrial firms who could act as Prime Machinery Contractors;
- a cost of \$65 M per boat was anticipated, possibly plus upwards of a further 10 percent;
- additional costs could be anticipated in regard to
  - . shipbuilding and industrial facilities - \$ 10 M
  - . logistic support - \$ 16 M
  - . training facilities - \$ 10 M

- annual expenditure for one yard producing a series of boats at 15 month intervals would be about \$ 52 M.

This report went forward to Naval Board where I noted cautiously that the financial implications were "based on the best evidence available...and were not necessarily firm."<sup>15</sup> We also sought to improve the flow of information from the USN by an expression of formal government interest in the Project.

Naval Board simply noted the Progress Report and, in March we produced a Second Report, based on further discussions with the USN, noting that the cost estimates were now "as accurate as the Study will achieve."<sup>16</sup> Thus our work now moved to its conclusion and by the end of June (as originally intended) we produced a report of some 200 pages bound, for distinctiveness, in a bright yellow cover and dealing with all aspects of the project.<sup>17</sup> One that deserves further mention related to Program Administration. Thus, while trying to avoid the complete separation of nuclear activities--as the USN's approach appeared to us--we sought, in a somewhat straightforward fashion, to obtain some on-going central direction for the Project. Compared to subsequent complexities in DND we were somewhat unsophisticated, but it was proposed that the key entities (DND, DDP, AECL, Shipbuilding and Prime Machinery Contractor) should vest authority for the project in specific individuals, "Project Managers," who would have close personal contact, meeting frequently as a Directing Group with appropriate authority. This was, perhaps, a somewhat tentative forward step, but mildly outrageous in the RCN organization of the era. Nearly twenty recommendations were made, which can be consolidated in the following:

- an early statement of Government intent with, if appropriate, an

- indication of the number of submarines involved;
- limitations to one shipyard in the East Coast on St. Lawrence;
  - a proven USN design to be adopted with no Canadian design changes;
  - Halifax to be established as the refit base with an eventual submarine tender for operational maintenance;
  - integrated direction and planning of the construction program;
  - continuity of employment in the nuclear or submarine field, particularly for Naval Personnel;
  - a Headquarters Project Group to be retained pending further decisions.

As well, and separately, we had been continuing our assessment of Shipbuilders and Machinery Contractors based on our analyses of their responses and proposals. This led to a tentative selection in two Supplementary Reports that were not circulated.

Fairly rapidly our Report went forward to Board "in conjunction with a draft submission to Chiefs of Staff Committee" and this was the only item on the agenda of a meeting, lasting some 2-1/2 hours, towards the end of July.<sup>18</sup> Essentially Board noted and accepted the Report, with some amplification of the proposed submission to Chiefs of Staff.<sup>19</sup> This observed that provision was being made, in the 1960-61 Estimates, for mounting a nuclear submarine construction program and sought approval in principle for this inclusion, with a firm statement to this regard so that arrangements for the exchange of nuclear information could continue.

This then, marks the conclusion of a phase. Spencer's original concept of nuclear propulsion for surface ships was somewhat ahead of its

time and, indeed, is still not an economical accomplishment for smaller vessels. Very soon, the RCN's contemplation of its own Submarine Service led to the clear desirability for nuclear submarines and the feasibility of this aspiration was to be thoroughly investigated by the Nuclear Submarine Survey Team. Their conclusion was, in brief, that the project was feasible but expensive. Naval Board's reception, though cordial, was somewhat cool and non-committed. With little rhetoric (perhaps with less than might have been desired) they merely presented a submission to the Chiefs of Staff urging approval in principle--and that, somewhat expeditiously.

At this point, I went off (belatedly) to spend a year at NDC--so that events burgeoned for a while without my direct involvement. (And probably none the worse for that!)

#### Developments Post-NSST

It did not take very long for the nuclear determination to erode markedly. Thus, in September 1959 Naval Board met with the visiting Flag Officer Submarines (FOSM) from the RN.<sup>20</sup> On this occasion, apropos the recent nuclear study it was observed that:

If this was not practical for reasons of cost or other factors, it would have to be decided whether it was worthwhile to construct or acquire conventional submarines.

Here FOSM, just possibly with a view to the potential sale of British conventionals, suggested that "for the next two decades" there would still be a useful and significant role for them, and noted that the RN's submarine fleet

would consist primarily of conventional submarines, although nuclear submarines would be phased in as funds permitted.

All this retrenchment came to a head in an Aide Memoire in November, which

concluded:<sup>21</sup>

Nuclear submarines are preferred but as long as cost is the main consideration then the Service should be equipped with conventional submarines of proven US or UK design constructed on the basis of equal priority with surface vessels of the planned replacement program.

A turning point was reached in March 1960 when the RCN approached the Cabinet Defence Committee, noting the results of the NSST study, particularly the unit cost, compared with the much lower cost of conventionals, said to range from \$8 M (in the UK) to \$18 M (in the US).<sup>22</sup> Thus Chiefs of Staff agreed to request approval in principle for the RCN to introduce a Submarine Service, with subsequent recommendations to be made about procurement, ideally to start in 1961. In approving this proposal Cabinet Defence Committee, understandably, called for a study of all its aspects "by Chiefs of Staff and the departments represented on the (Cabinet) Committee."<sup>23</sup> And, as will turn out to be the practice, a Committee was set up, similar to the NSST and with some of the same members, to

examine in detail all possible means of acquisition including the construction in Canada, of conventional submarines of proven design.

In this instance, only some two months' study was involved and, in June 1960, the Committee reviewed the merits of the British OBERON class (at an anticipated cost of \$9 M per unit) and the US BARBEL class (at about \$22 M). They concluded that, in general:

the establishment of an RCN submarine arm of the numbers envisaged (total of nine--six East and three West) is practicable within the financial and personnel limitations now existing and these submarines could be produced in Canada if desired.

As to the selection, they recommended:

- OBERON Class, purchased in the UK if the unit cost is of prime importance;



- BARBEL Class, if maximum suitability to RCN requirements and/or Canadian production are the prime considerations.

In spite of this, CNTS (by now, though of course we did not know it, in the last year of his life) made a plea for retaining some contact, by training and familiarization, that would "enable a nuclear propulsion program to be implemented with a minimum of two years' notice." Board agreed to this "as a planning guide"--a decision which, it is hoped, has been followed.

Fairly promptly, Naval Board reviewed the Report of the Conventional Submarine Survey Committee and reached a firm conclusion that:<sup>25</sup>

Submarines should be of the United States BARBEL Class which represents a most efficient development of the conventional submarine and provides maximum suitability for RCN requirements and Canadian construction.

More detailed cost estimates were required and, following Cabinet Defence Committee's direction to involve other Departments, approaches were made to DM and Treasury Board Staff as well as in the Naval Shipbuilding Panel.<sup>26</sup> All this led to a recommendation to Cabinet Defence Committee in August 1960 noting the earlier direction and the subsequent discussions, and recommending the building of six BARBELs (at the rate of two a year during the period 1961 to 1968) as being "practicable within the financial and manpower limitations now existing," these to be built "instead of a further six surface escorts which are required as replacement for our rapidly aging ships."<sup>27</sup> (A situation with some contemporary familiarity!)

It seems that an earlier inclination toward nuclear submarines had now been succeeded by a measure of commitment to conventionals and, particularly, to the US BARBEL Class.

However, once again, a firm decision began to be eroded. A hint of this came in September 1960 when CNS sent "Exclusive" messages to the RCN

representatives in Britain and the US asking for a "statement of policy" regarding future construction programs for conventionally powered submarines, so as to be able to assure the Government that obsolete vessels were not being considered.<sup>28</sup> It was reported that both BARBELs and OBERONs had an ongoing Anti-Submarine capability and role. Meanwhile--and, perhaps, somewhat mysteriously--Cabinet Defence Committee, meeting on 14 September 1960, had postponed action on the August recommendation for six BARBELs "pending further consideration."<sup>29</sup> CDC, in fact, raised certain issues:

- seeking confirmation that the acquisition of six conventional submarines, instead of replacements for six average A/S Escorts, was acceptable to SACLANT;
- what conventional submarine programs were being undertaken in other allied nations;
- need for the preparation of a paper explaining to the public the reasons why Canada proposed to acquire submarines.

And here, somewhat surprisingly OBERON comes back (and, as it turned out, was to remain) in the picture. In late October a Memorandum went forward from CNS to the incoming Minister.<sup>30</sup> It may be noted here that George Pearkes, the previous Minister of Naval Defence, had been elevated to become Lt. Governor of British Columbia. He had been succeeded, in October, by D.S. Harkness who, not unreasonably, had some questions and proposals. Thus, CNS notes:

You asked that a question of program of constructing OBERON Class Submarines in the UK be considered, together with the possibility of building, at the same time, some surface A/S vessels in Canada, within the total financial program mentioned.

To this CNS responded, in somewhat equivocal terms, by concluding that

"while six BARBELs would make a most effective long-term anti-submarine contribution to NATO" as an alternative " six OBERONs...and four ASW frigates would be a valuable contribution."<sup>31</sup>

There now emerged a new approach to Cabinet Defence Committee, at the beginning of 1961, which responded to their earlier questions:<sup>32</sup>

- SACLANT did support the RCN approach;
- the USN would build no more conventionals; the RN would continue with the "O" class (and possibly others); several NATO nations were operating conventional submarines but they were all too small for Canadian requirements.
- a paper of justification was provided.

At this point there was some broadening of interest and, in April, there was a question in Parliament for the Prime Minister regarding the placing of contracts for six submarines. On this occasion, Mr. Diefenbaker could be appropriately categorical noting that "no decision has been made by the Government to purchase or build six or any number of submarines."<sup>33</sup>

At this point the situation, even after diligent searching of the records and Ministerial correspondence, appears somewhat confused, nor does there appear to have been any Cabinet Committee Decision. However, in the first half of 1961 the incoming VCNS (RAdm. J.V. Brock) had, at CNS's direction, led an Ad Hoc Committee on Naval Objectives. This, among other matters, reiterated support for six BARBELs to be completed between 1961 and 1968 possibly to be followed by six nuclears. At about the same time, and in my role as Director General Ships, I wrote a lengthy paper for CNTS noting that:<sup>34</sup>

In view of recent comments and a suggestion, at least, of an increasing awareness of the desirability of nuclear submarines--it was

thought desirable to prepare some comments for your possible use.

(Here it may be noted that CNTS was RAdm. J.B. Caldwell who had ascended to the position on Spencer's death in January 1961.)

This paper, which was passed to CNS, essentially brought the NSST Report up-to-date. Brock rapidly demolished this suggestion and, with considerable guile, used the NSST Report on the difficulties of building nuclear submarines to argue for conventionals. (In this, of course, he ignored the Report's main conclusion that these vessels could be built in Canada.) With typical confidence he asserted:<sup>35</sup>

My own personal view is that 6 BARBEL Class is exactly the right number of submarines to gear the Canadian ship-building industry to this new endeavour.

These considerations prevailed in Naval Headquarters until nearly the end of 1961 when, in mid November, the Naval Member Canadian Joint Staff in London reported that Admiralty "unofficially indicated" that there was a "good probability" of the RCN purchasing an OBERON at an early date with an additional two early thereafter.<sup>36</sup> And this was shortly followed by a further proposal to Cabinet Defence Committee.<sup>37</sup> This latter is somewhat surprising, in that the matter is not recorded as having been discussed at Naval Board. At any event, CDC were presented with alternative programs, viz.:

- (i) (a) Six BARBELs, plus
- (b) Eight General Purpose Frigates in 1963;
- or
- (ii) (a) Three OBERONS, as a first phase;
- (b) Develop proposals to build advanced type submarines in UK;
- (c) Eight General Purpose Frigates in 1963.

The Cabinet Defence Committee brooded over these proposals for some time but, in the Spring of 1962, produced a comprehensive set of decisions:<sup>38</sup>

- (a) Canada to purchase three OBERONs from UK;
- (b) Firm proposals to be developed for building advanced type submarines in Canada in the future;
- (c) Construction of eight General Purpose Frigates at the rate of two per year;
- (d) No arrangements to be announced until discussions had been completed with the UK on the "swap" arrangements that purchase of OBERONs might make possible.

Now, at last, the die was cast and a decision had been achieved--perhaps, however, not entirely to the RCN's liking; for VCNS, in light of this decision, could not "let well alone" and struck another Committee (The 1962 Submarine Committee) to undertake a "re-examination of the overall RCN requirement for submarines."<sup>39</sup>

It may be noted also that, during this summer, there were conversations and correspondence between the Defence Ministers in Canada and the UK regarding potential items of "offsetting procurement" by the RN in Canada. Apparently these were unsuccessful.

#### The Work of the 1962 Submarine Committee

There was a similar mandate to the two earlier Committees that is, to examine:

- the RCN requirement for submarines;
- all aspects of building nuclear and conventional submarines;
- the findings of previous reports, and updating them if required;

- provide a costed submarine program to meet RCN requirements.

Somewhat differently, this was to be a Committee primarily of operational people, chaired by ACNS (A&W) although Stephens and I were members. In this latter regard, my visit to the UK early in 1962 had produced a good deal of useful information about the OBERON program and, particularly, the confirmation that a conventional successor was not (at that time) being contemplated.

The Report of this Committee, in July 1962, inevitably re-hashed a good deal of earlier material and studies but, somewhat astonishingly in view of the political decisions already achieved, concluded that "only the nuclear propelled attack submarines meet the RCN requirements" and--with considerable boldness--called for the selection of the sophisticated deep-diving THRESHER Class, to be built in Canada and with a programme cost (for six vessels) of \$400 M.<sup>40</sup> As well, the Report also recommended the acquisition of three OBERONS and of the three "A" class boats currently on loan from the RN. Surprisingly (in view of the apparent urgency in its preparation) little note appeared to be taken of this rather bold set of proposals. In a sense, its thunder was stolen by a visit, in October 1962, from the RN's First Sea Lord--Sir Caspar John, who in meeting with Naval Board put some "teeth" into the OBERON proposal noting that:<sup>41</sup>

- OCELOT, then building at Chatham, could be made available to the RCN on completion in 1963;
- there would be no further RN conventional program;
- now was the time for Canada to enter the current OBERON building program;
- Admiralty would have to be informed soon for the OCELOT offer

could not be held open indefinitely.

As well, there was some inconclusive discussion of materiel that might be purchased by Admiralty in Canada to help offset the costs. In this regard, Board could only conclude that the "possibility of an understanding with the British be explored," whereby they "would agree to make some offsetting purchases of classified defence equipment over the next few years."

Now came the somewhat difficult review of the 1962 Report when it was considered by Naval Policy and Coordinating Committee (NPCC) in November 1962.<sup>42</sup> It was presented, apparently apologetically, by ACNS(A&W) who observed that it was "a good document within the bounds of the assumptions put forward by the paper" but that it examined the proposed submarine service in isolation and that it might not necessarily be "the best thing for the RCN as a whole." This provided the opening for NPCC's Chairman, RAdm. Brock, who clearly was somewhat irked that proposals of the Report were substantially at variance with the six BARBELs endorsed by his Ad Hoc Committee on Naval Objectives (ignoring the situation, that BARBELs themselves now seemed to have been superseded by OBERONs.) Thus, apart from a certain amount of "faint praise" for the work involved and the information gathered, the Report was damned since nuclear submarines involved a cost "clearly beyond the financial capabilities of the RCN" and thus "NPCC had to conclude that the recommendations as a whole were open to question." This latter piece of contumely was somewhat modified in the next meeting of NPCC where it was concluded, more gently, that:

the feasibility of implementing the recommendations as a whole was open to question.

At any event, this was almost the "last hurrah" for nuclear submarines

in the RCN at that period and was to be sustained for a quarter of a century. And 1962 ended with a new A/CNS(A&W), Cmdre. A.B.R. Fraser-Harris, who was a good deal more interested in the (then on-going) development of the General Purpose Frigate. Thus, there was somewhat of a down-playing of the RCN's submarine requirements.

### Fulfillment in 1963

The year 1963, however, saw matters rapidly begin to take shape with the preparation of a Memorandum to Cabinet relating to OBERON procurement.<sup>43</sup> The Minister noted that, as directed by Cabinet Defence Committee's earlier approval, he had been negotiating offsetting procurement with his British counterparts, coming to the identification of a range of (fortunately classified) materiel that could lead to Admiralty purchases of some \$14 M. The purchase of OBERONs was again recommended at a total cost of about \$33 M. There was some contention about the potential offsetting purchases from the Department of Defence Production, but Deputy Minister DND stuck to his guns observing, somewhat opaquely, that:<sup>44</sup>

in the context of the statement they are prepared to have made, it constitutes somewhat of a gentleman's agreement to have in the order of this amount spent if the project is successful.

Nevertheless it still took considerable time, with the RCN now pressing--in spite of no formal decision--for firm delivery dates, which were suggested as mid 1967, late 1968, and mid 1969. Indeed, after extensive delaying the RCN now became somewhat importunate and in mid 1963 made another approach to Cabinet Defence Committee proposing that three OBERONs should be procured "providing they could be delivered before end 1967" and that there should be further investigation with the USN with regard to constructing three nuclear boats in Canada beginning in fiscal



year 1966-67.<sup>45</sup>

But all this was largely rhetoric. The die had clearly been cast and in July CNTS was actively seeking the formation of, and proposing members for, a Team to undertake negotiations with Admiralty. Their selection was to be based:

not only on the appointments now held by individuals but, more particularly, in view of their particular knowledge of the matter under discussion.

Since I was now (somewhat by osmosis) a submarine "expert," had been earlier involved with the British in negotiations regarding the outfitting of BONAVENTURE, and (possibly) had some "respectability" as a former member of the Royal Corps of Naval Constructors I was, to my surprise, chosen to lead the Team. This was a varied group with operational, technical and supply members as well as representatives from DM/DND and from DDP.

#### The Work of the "OBERON" Negotiating Team

There were fairly comprehensive Terms of Reference for the Negotiating Team which related to:

- implications regarding a first boat, probably one under construction;
- determination of the arrangements for the next two boats;
- considerations relating to all three, e.g., overseeing, stores, spare parts, and maintenance.

Particularly, and to achieve a substantial measure of commonality<sup>46</sup> between the three boats it was desired that all three should be built in the same yard, and (for DDP) preferably on the basis of a competitive fixed-price tender among private shipyards. Scott's, Vickers, and Cammell

Laird's were the possible contenders. After various delays, the Team arrived in London in midweek at the end of October. This was fortunate, in that a number of initial visits and contacts could be made prior to the commencement of negotiations the following week. (Among these was a stop at the Australian Joint Staff Mission, already engaged with the building of OBERONS in Britain for the RAN).

At this point it became apparent, and this may have some current relevance, that the limited number of firms involved, and their current obligations, could make the situation difficult for newcomers; for, in 1963, the builders were somewhat saturated with British and Australian orders, as well as becoming pre-occupied with a general shift from conventional to nuclear construction. The Admiralty were indeed prepared to make one boat available from their current construction but, for a time, it appeared that three from one yard might be difficult. As the discussions proceeded, the Admiralty's offer of ONYX (then building at Chatham Dockyard and due to complete in 1965) opened the way to the possibility of building all three at that yard. And, as negotiations began, we were helped by an announcement from the Minister of Defence in the House on 5 November that negotiations for three OBERONS were in hand.<sup>47</sup>

Thus strengthened, and in a flurry of message traffic with Ottawa we noted our intention:<sup>48</sup>

to take a very firm line with Admiralty implying that inability to achieve three boats from Chatham will throw doubts on procurement at all.

This was perhaps a little more than CNTS could swallow and he responded "...support your stand, but not to the point of prejudicing negotiations."<sup>49</sup> As the deliberations proceeded we perhaps turned a blind eye to this caution and our Report noted that the<sup>50</sup>

RCN Team laid particular stress on desire for three boats from one yard and stated that Canada would 'insist' on this.

In the event, Admiralty accepted this proviso, noting that the "RCN firm stand was considered to be helpful." Indeed, since parts of Admiralty (at least) were anxious to have work for Chatham Dockyard, "helpful" is probably an appropriate word.

The situation, however, was less attractive to DDP who--in the interests of more effective procurement--had, as noted, been anxious to obtain a competitive fixed-price contract from competent shipyards. The Royal Dockyards (Chatham being the oldest) were not allowed, by law, "to make a profit or a loss" and hence could not quote a fixed price. Thus our Report, noting the considerable experience at Chatham in building submarines, concluded that:

it was agreed that the most satisfactory solution would be to make the best estimate for the cost of the boat and to add to this a contingency to produce a ceiling price...which would not be exceeded.

Unfortunately (but not unusually) it now appeared that the total cost of the three boats, including a modest amount for design changes, contingency allowance, escalation, first outfit of stores, base and depot spares, etc., would be nearer \$40 M than the \$33 M of the estimate.

Arrangements were also made for an OBERON Liaison Team to be located at Chatham during the construction program.

#### Reception of the OBERON Negotiations

Returning to Canada, we quickly moved through a series of presentations to interested entities: the Naval Policy and Coordinating Committee, the Naval Shipbuilding Panel and, finally on 22 November, Naval Board.<sup>51</sup> All went very well at these meetings with no disputes and

confirmation of a direction to proceed. Capt. W.B. Christie (later Rear-Admiral) took up, in a formal way, his duties as "Canadian Naval Submarine Technical Representative" (initially in Ottawa) on 12 December, and it was also agreed that the boats were to be named OKANAGAN, OJIBWAY (later changed to OJIBWA) and ONONDAGA.<sup>52</sup>

An intriguing financial point arose in mid December with regard to the first significant financial payment, of \$10 M.<sup>53</sup> For their own reasons Admiralty wanted to receive the funds in April, while DND (no doubt for equally good reasons) wanted to make the payment in March. Thus, unusually perhaps, common sense prevailed and it was agreed that the cheque for \$10 M "in payment for work completed" would be signed in March and handed over (not inappropriately perhaps) on 1 April. At any event the year ended with a flurry of social arrangements regarding the launch, scheduled for February, and a cordial exchange of letters between Admiralty and DDP leading to the sending of a "Letter of Intent" on 31 December 1963.

Perhaps, as an offset to this serious account it is not inappropriate to conclude with some lighter observations. Thus, in February 1964, a Naval Shipbuilding Panel meeting addressed the initial payment to Admiralty. Here, the normally sober minutes illuminate a spirited occasion:<sup>54</sup>

Mr. 'M' (of DDP) mentioned that a letter had been prepared for the Minister's signature asking TB to authorize payment of \$10 million from this year's funds. This provoked an animated discussion as to whether or not the figure should be \$12 million in lieu of \$10 million. Despite all protestations including a robust round of satiric remarks that the \$10 million figure was the highest the RCN had communicated to DDP the Panel prevailed upon Mr. 'M' to see whether or not the Minister had signed the letter and, if not, to have the figure changed to \$12 million.

On his return to the meeting, Mr. 'M.' informed the Panel that the letter had not been signed and therefore the figure had been changed.

This apparent casual abandon with the expenditure of millions of dollars was countered, the very next day, by an expression of frugality. It so happened that Admiralty had already selected a sponsor for the launch of ONYX (now to be OJIBWA) and this was the wife of a distinguished R.N. Submarine Admiral. Needless to say, the RCN did not disturb these arrangements and indeed we prepared to present an appropriate gift. This was, in fact, an Eskimo parka together with a small Ojibwan basket of porcupine quills. Curiously, there had been some bureaucratic quibbling about this minor expense and, the day after the spirited Panel meeting, we evidently found it necessary to advise the British High Commissioner about the proposed presentation noting that:<sup>55</sup>

It would be greatly appreciated if the British Inland Revenue authorities could be informed of the Canadian intentions regarding the gift and asked to exercise their discretion in foregoing the payment of taxes and duty on the articles in question.

After all, we were spending \$40 M on these boats and it was certainly important to try and avoid the customs duties on a \$100 gift!

And, finally, it may be noted that the sponsor for the last submarine was to be the young French-speaking wife of the then Minister of National Defence, Leo Cadieux. This would clearly be a demanding occasion for her, with the obligation of inspecting a guard of honour. Here, the British rose admirably to the occasion and, to escort her, they provided a dignified fatherly Admiral who not only guided her through the intricacies, but did so in fluent French--a demonstration of that elusive quality, "class," at its best.

## Epilogue

As is not unusual, in life and affairs generally, there was an afterthought; and when Paul Hellyer became Minister of Defence in 1963 he caused the respected Dr. R. J. Sutherland to lead a team investigating a variety of Defence activities. Somewhat against their will apparently, they were bidden, early in 1964, to report on "A Canadian Nuclear Powered Submarine Program." This reviewed the procurement of the somewhat sophisticated THRESHERs, but doubted the validity of purchasing two of these at a cost of some \$200 M. They recommended that:<sup>56</sup>

the position of the Department should be that "a nuclear submarine program is under serious consideration but that no decision one way or the other had been taken."

And this advice appeared to be accepted, thereby closing, for the time, the matter of nuclear propulsion in the RCN.

## Conclusion

This review of an endeavour lasting more than a decade, with a somewhat minimal output of three new (but rather dated) conventional submarines at the modest cost of \$40 M, demonstrates the complexity and fluidity of defence procurement. As well, and in a more encouraging sense, it demonstrates the influence of individuals--political, bureaucratic or military--who have a particular motivation and, by fortunate occurrence, a length of tenure to enable them to maintain a flow of initiative and implementation. Unfortunately neither of these opportunities appear to present themselves in a continuing manner. Inevitably, it seems, there is an ebb and flow of personnel all of whom tend to bring in their own biases, inclinations, and aspirations. Thus, in this instance, and apparently

without a fixed intent, the humble OBERON won out over THRESHER, SKIPJACK, and BARBEL.

Perhaps the lesson to be learned is that it is particularly difficult, at the start of a proposed program, to predict how it will eventually turn out. This is demonstrated, perhaps, by the way in which a current long-standing program for the procurement of seven conventional submarines changed rapidly, in mid 1986, to a program of 10 or 12 nuclears.

Perhaps one might conclude by repeating an observation of the Sutherland Committee in 1964 regarding the purchase of THRESHERS.

There were many ways of spending \$200 M that would yield a more significant military capability and are more related to Canadian national interests.

Does this observation, albeit with the cost implications inflated by about 50 times, have relevance to the nuclear submarine proposal in the 1987 White Paper?

## Notes

<sup>1</sup>Contributing factors were that the use of natural uranium made it too large; and that the heavy water moderator, used at various levels to control output of the core, would not be effective with shipboard motion.

<sup>2</sup>This was the US/Canada Agreement for Cooperation concerning Civil Uses of Atomic Energy.

<sup>3</sup>NSS 6901-50(NCC), 28 June 1956, NCC to CNTS. Shortly after this, Baker returned to the UK.

<sup>4</sup>NSS 6901-40(E in C), 28 August 1956, E in C to CNTS and VCNS.

<sup>5</sup>Minutes of 81st Meeting of PPCC, 1 October 1956, #81-5 "Nuclear Propulsion" (NSS 6901-50).

<sup>6</sup>Minutes of 510th Meeting of Naval Board, 31 October 1956, #510-5 "Nuclear Propulsion" (NSS 6901-50).

<sup>7</sup>NSTS 8100-1/NSTS 6375-500/SS (Staff), 7 February 1958, DNPO to ACNS(P) and VCNS.

<sup>8</sup>NSS 6901 (E in C), 12 March 1958.

<sup>9</sup>Minutes of 564th Meeting of Naval Board, 2 April 1958, #564-4 'RCN Submarine Requirements' (NSTS 8100-1).

<sup>10</sup>CSC 1891.2, 2 June 1958.

<sup>11</sup>It would have to be admitted that, to his credit, Admiral Spencer relied upon persuasion and a sense of duty, rather than the weight of his rank.

<sup>12</sup>NSS 8000-SSN, 9 January 1959.

<sup>13</sup>NS 8000-SSN (CNTS), 22 January 1959 CNTS to VCNS.

<sup>14</sup>NSS 8000-SSN (Staff), 5 February 1959, DNPO to ACNS(P), VCNS, CNTS, CNS.

<sup>15</sup>Minutes of 589th Meeting of Naval Board, 11 March 1959, #589-3 "Nuclear Submarine Study - Progress Report" (NSS 8000-SSN).

<sup>16</sup>This was forwarded with NS 1920 NSST (NSST), 21 April 1959, NSST to CNTS.

<sup>17</sup>THE REPORT OF THE NUCLEAR SUBMARINE SURVEY TEAM CNCD93, June 1959.

<sup>18</sup>Minutes of 602nd Meeting of Naval Board, 24 July 1959, #602-2 "Nuclear Submarine Study - Report" (NSS-8000 SSN).



- <sup>19</sup> NSS 8000-SS Vol 3 (Staff) undated CNS to Chairman Chiefs of Staff.
- <sup>20</sup> Meeting of Members of Naval Board with Flag Officer Submarines (RN), 28 September 1959.
- <sup>21</sup> NSS 8000-35 (Staff), 20 November 1959, "Aide Memoire for the Chief of Naval Staff."
- <sup>22</sup> NSS 8000-SSN, 10 March 1960, "Memo for Cabinet Defence Committee."
- <sup>23</sup> NSS 8000-SS (Staff) CSC:1242.1, 14 April 1960; reports the CDC Decision at their 130th Meeting on 25 March 1960.
- <sup>24</sup> THE REPORT OF THE CONVENTIONAL SUBMARINE SURVEY COMMITTEE, June 1960.
- <sup>25</sup> Minutes of 625th Meeting of Naval Board, 20 July 1960, #625-2 "Procurement of Submarines for the RCN - Report of the Conventional Submarine Survey Committee" (NSS 8000-SS).
- <sup>26</sup> The Defence Supply Naval Shipbuilding Panel was a Committee chaired by an RCN representative (myself from 1960-1965) with representatives from DM/DND Staff, as well as from Treasury Board and the Department of Defence Production. It maintained a general oversight of all Naval Shipbuilding matters.
- <sup>27</sup> Memorandum for Cabinet Defence Committee from Minister of National Defence, 9 August 1960.
- <sup>28</sup> CANAVHED's 152023, September 1960, to CANAVBRIT and CANAVUS. Replies were CANAVUS 161850 and CANAVBRIT 29121.
- <sup>29</sup> While the CDC Meeting was on 14 September 1960, its report came in CSC:2.3 CSC1242.1, 30 September to CNS.
- <sup>30</sup> Memorandum to the Minister (cc Chairman Chiefs of Staff) from CNS, 27 October 1960.
- <sup>31</sup> These numbers led to approximately the same financial outlay as for 6 BARBELS.
- <sup>32</sup> Memorandum for Cabinet Defence Committee, 9 January 1961, "RCN Submarine Programme."
- <sup>33</sup> Hansard for 13 April 1961.
- <sup>34</sup> NSS 8200-SS (DG Ships), 21 July 1961, DG Ships to CNTS.
- <sup>35</sup> NSS 8200-SS (Staff), 22 August 1961 VCNS to CNS.
- <sup>36</sup> CANAVBRIT's 141623, November 1961.
- <sup>37</sup> Paper to Cabinet Defence Committee, 30 November 1961.

- <sup>38</sup>Minutes of Cabinet Defence Committee Meeting, 19 March 1962.
- <sup>39</sup>NS 8000-SS TD 2106 (Staff), 24 April 1962. VCNS to ACNS (A & W), CNS, ACNS(P), CNTS, CNP, NComp.
- <sup>40</sup>REPORT OF THE 1962 SUBMARINE COMMITTEE, July 1962.
- <sup>41</sup>NSS 8000-SS, 4 October 1962, CNS to Minister. Details of these discussions are included in an "Aide Memoire of Special Meeting of Naval Board," 3 October 1962.
- <sup>42</sup>Minutes of 251st Meeting of NPCC, 6 November 1962.
- <sup>43</sup>Memorandum to Cabinet "Procurement of OBERON Submarines," 31 January 1963.
- <sup>44</sup>Letter of 8 February 1963, DM/DND to DM/DDP.
- <sup>45</sup>Paper to Cabinet Defence Committee "Procurement of Submarines for the Royal Canadian Navy" (no date).
- <sup>46</sup>Since, in Britain, the practice was to leave a good deal of detailed outfitting to individual shipyards, it was desirable for all three Canadian submarines to come from the same builder. This commonality would facilitate future alternations or additions.
- <sup>47</sup>We did, in fact, read of this announcement in The Times on 6 November, before we had been advised by DND.
- <sup>48</sup>CANAVBRIT 071000, November 1963, S.M. Davis to CNTS.
- <sup>49</sup>CANAVHED 071535, November 1963, CNTS to S.M. Davis.
- <sup>50</sup>"Report to Naval Board on the Visit to Britain of the Joint RCN/DDP Negotiating Team for the Acquisition of Three 'OBERON' Class Submarines," 30 October - 13 November 1963.
- <sup>51</sup>Since we returned to Canada on 16 November and the sequence led to Naval Board meeting on 22 November affairs moved with commendable briskness.
- <sup>52</sup>NSC 8000-5 (Staff) of 5 December 1963, VCNS to CNS. It is interesting to note that the latter two names had been used by two HM ships on Lake Ontario in the 18th Century.
- <sup>53</sup>Minutes of 64th Meeting of Defence Supply Naval Shipbuilding Panel 12 December 1963, HQ 2-70-29-1.
- <sup>54</sup>Minutes of 65th Meeting of Defence Supply Naval Shipbuilding Panel, 6 February 1964, HQ 2-70-29-1.
- <sup>55</sup>NS 8000-SS72 (Staff) of 7 February 1964, Naval Secretary to British Trade Commission.

<sup>56</sup>Memorandum "A Canadian Nuclear Powered Submarine Program", 9 March 1964.

TERMS OF REFERENCE OF RCN  
NUCLEAR SUBMARINE SURVEY TEAM (NSST)

The Nuclear Submarine Survey Team shall be responsible through the Director of the Nuclear Submarine Team (D/NSST) to the Chief of Naval Technical Services, for the conduct of a detailed survey of, and report on the technical and financial aspects of procuring and maintaining nuclear propulsion submarines for the Royal Canadian Navy.

The Team shall be responsible for:

- (a) providing technical assistance to Naval Staff, regarding the selection of the most suitable existing design of nuclear powered submarine.
- (b) investigating all technical aspects of procurement of a submarine of selected design; through purchase from the US, complete production in Canada, or a compromise between these two methods.
- (c) investigating the capability of Canadian industry and shipyards to produce nuclear submarines and/or associated equipment of given characteristics and design.
- (d) Determination of the minimum requirements for a submarine building organization with particular reference to plant facilities, equipment, lifting appliances, available water depth, management, versatility and availability of labour force.
- (e) based on (a) through (d) above; recommending which major firms might desirably be associated with the production of nuclear submarines in Canada.
- (f) assessment of extensions to plant facilities that may be necessary to make Canadian production feasible, with consideration of the extent of Capital assistance (if any) involved.
- (g) assessment of the financial aspects of a Canadian submarine building programme.
- (h) drafting a provisional building programme to provide the fleet with nuclear submarines.
- (j) assessment of additional and/or special base maintenance, safety and logistic requirements and facilities, as requisite to the operation of nuclear submarines, including estimates of initial and recurring costs involved.
- (k) drafting a training schedule to provide the specially skilled technical personnel to meet the requirements of construction and

eventual maintenance of nuclear submarines.

- (1) investigating all matters that appear likely to affect cost and production time for submarines of selected design.

The Nuclear Submarine Survey Team will function as an integrated composite group, composed of members from the Department of National Defence, Atomic Energy of Canada Limited, and the Department of Defence Production.

#### MEMBERS OF THE NUCLEAR SUBMARINE SURVEY TEAM

##### RCN MEMBERS

Rear Admiral (E) B.R. Spencer

Constructor Captain S.M. Davis

Commander (E) R. St.G. Stephens

Commander (L) W.B. Christie

Constructor Lt. Cdr. J.M. Ashfield

Lt. Cdr. (L) C.R. Nixon

Lt. Cdr. (E) S.E. Hopkins

Mr. J. Rodd

Lt. (W) R.K. Dwyer

##### D.D.P.

Mr. W.H. Mayo

## ANNEX II

### MEANS AND EXTENT OF EXCHANGE OF INFORMATION ON MILITARY REACTORS BETWEEN THE UNITED STATES AND CANADA

The means and extent of the cooperation provided for under Article II BIS B of the US/Canada Agreement for Cooperation Concerning Civil Uses of Atomic Energy, as amended, shall be as follows:

#### I MEANS OF EXCHANGE

- A. The exchange of information provided for hereinafter will be conducted on the USA side through the Atomic Energy Commission or the Department of Defense as appropriate. The exchange on the Canadian side will be conducted through the Department of National Defence or Atomic Energy of Canada Limited as appropriate.
- B. The aforementioned agencies of the two governments will carry out the exchanges through procedures and channels already established under the agreement for cooperation, or through such other procedures and channels as may be agreed.
- C. The exchange of information will be accomplished through the various means available, including reports, conferences and visits.

#### II. EXTENT OF EXCHANGE

- A. Considerations involved in construction of nuclear-powered Submarines.
  - 1. The USA will provide such information as the parties may mutually determine to be required by the RCN to complete a feasibility study to determine whether or not a nuclear-powered submarine could be constructed in Canada for the RCN, bearing in mind time and cost factors. To the extent necessary, such exchange may include information concerning development, design, construction, operation and use of reactors for submarine nuclear propulsion plants. Information exchanged under this section will be limited to the following considerations applicable to nuclear propulsion plants for submarines:
    - (a) Industrial and material requirements;
    - (b) Personnel requirements, including training;
    - (c) Estimated time and cost factors involved in providing industrial facilities, material and personnel required for the construction and installation of a nuclear

(d) Maintenance and base facilities.

2. The exchange provided for by this section II A will continue until the conclusion of the aforementioned feasibility study now in progress by the RCN or until June 1/59, whichever is earlier, or such other time as the parties may mutually agree.