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TERRITORIAL AND SOVEREIGNTY PROBLEMS OF THE ARCTIC

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TERRITORIAL AND SOVEREIGNTY PROBLEMS OF THE ARCTIC

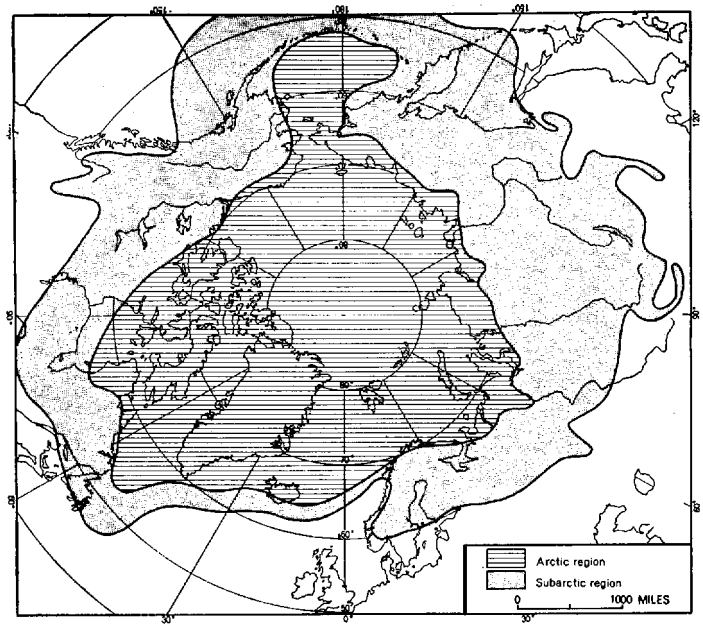
Summary

The Arctic, consisting mainly of a large, ice-covered sea and the lands bordering it, occupies a pivotal position in the midst of the major centers of world population and production. Currently the Arctic is important as a buffer between the USSR and the NATO countries, as a source of raw materials, as future living space, and as an area vital to the scientific investigation of physical phenomena of the earth. The USSR has long led and apparently still leads the world in Arctic research and development because, among other reasons, much of its land area and its only long coast lie in the far north. Recent scientific and technological advances such as improved aircraft, intercontinental ballistic missiles, and atomic submarines capable of launching missiles permit man to move and take hostile action in the Arctic in ways not previously possible. This new operational freedom has reduced the effectiveness of the Arctic as a buffer area and has made the region a critical military zone in which both the USSR and the NATO countries have spent large sums on offensive and defensive installations. At military bases on both sides of the Arctic, high standards of alertness are maintained and much dependence is placed on electronic warning devices. The improved means for moving about freely within the Arctic and the resulting increase in the danger of incidents have caused governments in the northern hemisphere to look anew at the limits of political control in the area and to weigh such matters as the limits of territorial seas and airspace, the meaning of sector claims, and the legal status of installations on floating ice. To alleviate the problems of the Arctic, "open skies" zones and schemes to demilitarize and internationalize the area have been proposed, but efforts to adopt plans of this type have thus far failed, largely because of the inability of the major powers to agree on inspection arrangements. Although the recent treaty providing for nonmilitarization of Antarctica insured by inspection might be pointed to as providing a precedent, arriving at a workable inspection plan for the Arctic will be a vastly more complicated problem.

I. Background

A. Limits of the Arctic

Astronomically, the Arctic is the north polar region bounded on the south by the Arctic Circle (66°30'N). Although the Arctic Circle is suitable for marking uniformity in length of daylight, it does not conform to major natural boundaries involving climate, oceanography, or vegetation. Because certain of the natural limits conform reasonably well among themselves, it seems most feasible to define the boundaries of the Arctic in climatological terms. The isotherm of 50°F for the warmest month, provided also that the mean temperature of the coldest month does not exceed 32°F, has been found to be a suitable basis



Limits of the Arctic and sub-Arctic.

for delimiting the Arctic (see map above). Generally, the isotherm of 50°F coincides with the northern limit of tree growth. Bordering the Arctic is the sub-Arctic region, which is a zone of transition to middle latitudes. The sub-Arctic is defined as having average summer temperatures exceeding 50°F for a period not longer than 4 months, and a mean temperature not exceeding 32°F in the coldest month. Because the two regions merge into each other, it is virtually impossible to consider the activities of man in the Arctic without including at least part of the sub-Arctic. The territory covered in this study will therefore include the entire area north of the isotherm of 50°F for the warmest months, with the limitations noted above, and such portions of the sub-Arctic as the discussion requires.

B. Arctic Environment

The Arctic region takes in the margins of two continental land masses that nearly enclose a central water body, the Arctic Ocean, which consists of two deep basins separated by a submarine ridge (see Bathymetric Map of the Arctic Basin, following p. 31). Most of the water flowing into the Arctic Ocean from the North Atlantic passes between Svalbard and Norway, whereas the outflow passes mainly between Svalbard and Greenland and to a smaller extent between Greenland and the Canadian mainland. 1/* Arctic-Pacific water exchange is negligible, being restricted by the shallow channel through Bering Strait. The Arctic Ocean has a permanent cover of slowly circulating pack ice, which in summer retreats sufficiently to permit navigation along bordering coasts for a season varying from a few weeks to 3 months. Two important exceptions are (1) the waters along the north coasts of Greenland and the northernmost Canadian islands, which are not navigable at any time, and (2) the sea approaches to Murmansk, which are open to shipping all year as a result of the warming influence of the Gulf Stream.

Broad, muddy flats are characteristic of much of the coast fringing the Arctic Ocean, especially the USSR and Alaska sections; but the coast also includes areas of low, barren rock hills and deeply indented fjords as well as conspicuous mountain peaks. The largest icecap in the Arctic covers all of Greenland except the rocky coastal margins; smaller icecaps are found in Svalbard and Franz Josef Land and in Labrador. Mountain glaciers are common except in the European USSR and western Siberia. The principal rivers that flow into the Arctic Ocean (six in the USSR, one in Canada) are ice-free only in the late summer.

Most Arctic areas have a mean annual precipitation of less than 15 inches, of which two-thirds is likely to fall as summer rain. The amount of winter snowfall generally decreases from south to north, and some Arctic islands are almost free of snow in winter. 2/ The blowing and drifting of snow during the Arctic winter, however, impedes both surface and air travel. Fog often blankets the sea and nearby coasts in summer. Many climatological and glaciological signs point to progressive warming in the Arctic during the last century. The determination of whether this constitutes a short-term trend or a major climatic change is an important scientific objective.

The scarce plant life of the Arctic lands has a distinct north-south zonal arrangement. In the extreme north is the treeless tundra

* For serially numbered source references, see Appendix C.

region characterized by vegetation consisting of lichens, mosses, and clumps of grass in sheltered places and by much barren soil or rock. The southern limit of the tundra is near the 50°F summer isotherm. To the south, greater warmth in summer supports many species of grass, widely spaced shrubs, and scattered small trees as well as lichens and mosses. Farther south, this zone, which includes a large part of the northern sub-Arctic, gives way to dense coniferous forest. 3/

Animal life is relatively abundant in the Arctic in spite of the harsh environment. Caribou (reindeer), muskox, hare, and lemming abound, along with the carnivores that feed on them -- fox, wolf, lynx, bear, and members of the weasel family. Along the shores of the Arctic Ocean and on the polar icepack are millions of seals, which in turn are hunted by the polar bear. Walrus and whales are also present but in smaller numbers. In the sea are flounder, cod, herring, char, and mollusks; and the rivers and lakes support whitefish, trout, and salmon. The tundra is the breeding ground of numerous birds such as geese, ducks, gulls, auks, and petrels. 4/

Man's adjustment to the Arctic can follow either of two courses: the environment-adapted way of life of the Eskimo or a synthetic environment pattern based mainly on supplies imported from the middle latitudes. Even with the best of imports, however, people conditioned to the middle latitudes face formidable problems in adapting themselves and their ways to the Arctic. Critical among the problems are those of adjusting to the limitations that extreme cold and strong winds place on human activity. Adapting to the Arctic's great seasonal and diurnal variations in the length of daylight, twilight, and darkness is also difficult. Another major problem for human occupance is the permafrost (permanently frozen soil), which underlies all Arctic lands except southern Greenland and most of Iceland. Permafrost hampers construction activities of all types and presents particularly serious problems in the fields of water supply, sewage disposal, and transportation. Other factors retarding the activities of man are the extensive areas of marshland that exist in summer and the hordes of insects that breed in them.

C. Strategic Role

The northern hemisphere, of which the Arctic forms the center, is the homeland of 90 percent of the human race and the site of most of the earth's productive capacity. This pivotal position of the Arctic was of little practical importance until reliable means were devised for using the short trans-Arctic routes between developed areas farther south. Improvement in long-range aircraft (followed by the certainty that successful intercontinental ballistic missiles would be developed) provided the necessary means of communication and brought

the central position of the Arctic into new focus. The march of science and technology is continually adding new facets to the focal role of the Arctic and is at the same time reducing its importance as a buffer.

Many of the basic physical relationships of the earth that can be investigated only in the Arctic have acquired direct and indirect military importance, and it is to be expected that this trend will continue, making it increasingly difficult to separate the Arctic's strategic and scientific roles. Such relationships include, for example, weather and climate, geomagnetism, ionosphere and the propagation of radio waves, and oceanography of the Arctic Ocean and its adjacent seas.

Appreciation of the Arctic's strategic role has led the USSR and the US to develop extensive Arctic military installations, both offensive and defensive, the latter involving radar facilities and supporting communications arranged to form warning networks. In the Soviet Arctic the heaviest concentrations of military installations are now located at the eastern and western ends, the areas nearest to non-Soviet territory. In general, the same pattern is repeated in the non-Soviet Arctic.

D. Economic Development

The economy of the Arctic is based mainly on extracting and processing minerals, fish, furs, and timber (the last being largely a product of regions immediately south of the Arctic proper) and on smaller fabricating industries. Arctic products, for the most part, move to middle latitude markets by sea and to a lesser extent by inland waterways, land routes, and air.

Economic activity in the Arctic other than the survival economy of aboriginal peoples is basically constricted between limited opportunities for profit and the high cost of importing food, fuel, and other necessities, which, in short, have created a synthetic environment. In many cases, however, the weighing of profit and loss is distorted by direct and indirect subsidies that Arctic economic activities receive from the mother countries -- subsidies motivated by considerations of strategy and long-range planning.

Except in marine products, the Arctic apparently will never be important as a surplus food-producing area, but such food as can be produced locally is of great significance as an influence on economic development in other fields. For example, proximity to an area that could supply half the food needs of a mining community might mean the difference between profit and loss in the exploitation of a mineral

deposit. Considerable effort is being directed toward the development of crops and livestock that have been raised successfully in some parts of the Arctic. There is no apparent reason why an expanding Arctic population should not be able to produce its own fresh foods, at least in summer, and some of its requirements in winter wherever sufficient heat can be generated. 5/

Throughout the Arctic, great dependence is placed on radio for communication, although the network of land lines is fairly well developed in the western portion of the Soviet Arctic. If the limits of the Arctic are strictly interpreted, only one port in the region -- Murmansk, USSR -- is served by a railroad connected with continental systems. However, a number of ports along the margins of the Arctic proper have continental rail connections, notably Arkhangel'sk, USSR; Narvik, Norway; and Churchill, on Canada's Hudson Bay. The Alaskan ports of Seward, Anchorage, Cordova, and Skagway are served only by local lines. In the Soviet Arctic, railroads and roads are limited to the relatively populous west; in the east, there are no railroads and roads are virtually nonexistent. The north-south trend of rivers and mountains has retarded construction of east-west land routes in the USSR and accounts in part for the emphasis that nation has given to development of the Northern Sea Route. Roads are also scarce in the non-Soviet Arctic, except in northern Norway. Canada's current "develop the north" program includes road-building and railroad-building projects that will greatly improve land transportation in the northlands. 6/ The sled, drawn by dog, reindeer, horse, or tractor, still has a significant role in the movement of man and his goods in the Arctic. Tractor-drawn sled trains are likely to increase considerably in importance. Inland waterway transportation is of considerable importance in the Soviet, Canadian, and Alaskan portions of the Arctic, but its possibilities are limited by short navigation seasons. Air transportation has helped open up previously inaccessible Arctic areas, and most important centers are now served by civil air lines. The cost of moving freight by air, however, still puts sharp limits on the use of aircraft as a means of commercial transport. Only a fraction of the potential for intercontinental civil air routes across the Arctic can be realized in the present politically divided world. Routes now flown include Copenhagen-Los Angeles, Copenhagen-Alaska-Tokyo, and Paris-Alaska-Tokyo.

E. Sociological Factors

The population of the Arctic, although now extremely sparse, seems certain to increase in the next 50 years as pressure on the resources of more favored lands becomes more intense.

Over 1 million people now live in the Soviet Arctic north of the tree line. Most of them are concentrated in the large port cities of the European Arctic, such as Arkhangel'sk (265,000) and Murmansk (226,000), and in mining centers of the central Arctic, such as Noril'sk (106,000) and Vorkuta (55,000). Populated places of less significance include smaller mining towns, river ports, and military establishments. Large areas in the Soviet Arctic are still uninhabited, however, except for small bands of indigenes. 7/

Even the most populous sections of the non-Soviet Arctic, such as northern Norway and Iceland, cannot compare in population density with the most highly developed sections of the Soviet Arctic. The wholly immigrant population of Svalbard consists of some 2,700 Soviet and 1,000 Norwegian nationals. Greenland has a population of some 28,000, widely dispersed along its coast. In Canada, about 10,300 indigenes and 800 whites live in scattered settlements along the Arctic shores. The population of Arctic Alaska, totaling about 12,000, is also widely scattered. In Alaska, Canada, Greenland, and Iceland the number of persons stationed at military installations is sizable.

The cultures of aboriginal Arctic peoples are gradually giving way to the techniques of middle latitude civilizations, and examples of yesterday's way of life, which was entirely adapted to environment, are now rare. With the mixing of cultures has come considerable racial mixing, and in many areas the line between aboriginal peoples and immigrant peoples is hard to draw. 8/

II. Patterns and Problems of Territorial Jurisdiction

A. Development and Status of Main Political Patterns

Six countries hold jurisdiction over the lands of the Arctic region: the US (Alaska), Canada, Denmark (Greenland), Iceland, Norway, and the USSR. They acquired title in various ways: by discovering, laying formal claim to, and effectively occupying previously unknown lands; by conquest, cession, and purchase; and, in the case of Iceland, by grant of independence from a former mother country. Most Arctic powers govern their northern territories from a distant capital, delegating local responsibility through a variety of governmental forms. Within the Arctic realm, only Iceland is completely independent.

The entire Arctic region includes only two international land boundaries: US (Alaska)-Canada and USSR-Norway. The most recent change in land boundaries in the Arctic occurred in 1944 when Finland ceded the Pechenga (Petsamo) area to the USSR, thereby giving the USSR and Norway a common boundary. Extension of this boundary through territorial seas in the Varangerfjord area was the subject of a 10-year dispute between Norway and the USSR that was not resolved until 1957. 9/

Lines of allocation drawn through the sea to divide the islands, rocks, shoals, and, in some cases, territorial waters of one country from those of another are not numerous in the Arctic. If the Varangerfjord line noted above is excepted, there are only three such lines of allocation: (1) the US-Russian convention line of 1867 through the Bering Strait; (2) the line dividing Greenland from Ellesmere and other Canadian islands, a median line apparently without treaty basis, which is shown on official Canadian maps but not on Danish maps; and (3) the Svalbard treaty line of 1920, which encloses the islands of the Svalbard Archipelago. None of these lines is now in dispute.

Existing Arctic sovereignty patterns are not currently being contested actively. In recent years, however, disputes have arisen over fishing rights and the limits of territorial waters, the latter being challenged mainly because of fishing rights. The meaning and scope of Canadian and Soviet sector claims has also been questioned (see Section III B, p. 18). New scientific-military developments having Arctic application, such as the atomic submarine, have not yet given rise to disputes, but they have caused governments of the Northern Hemisphere to look anew at Arctic sovereignty limits and to consider such matters as the legal status of semipermanent installations on floating ice, Arctic demilitarization schemes, and the possible need for an international treaty law keyed specifically to conditions in the Arctic.

The machinery through which governmental authority is exercised in Arctic lands varies greatly in type and structure from country to country. Iceland is an independent republic with a long democratic tradition. Greenland, formerly in quasi-colonial status, became an integral part of the Kingdom of Denmark in 1953. To date, however, the effects of this constitutional change have been more theoretical than real. The Arctic lands of Canada take in the northern extremities of two provinces (Quebec and Newfoundland) and parts of two territories governed by commissioners. Many governmental functions in the Canadian Arctic are exercised directly by departments of the national government. Alaska officially became the forty-ninth state of the US on 3 January 1959. Some time will elapse, however, before state governmental machinery is able to exercise all appropriate functions. Soviet Arctic lands fall wholly within the Russian Soviet Federated Socialist Republic (RSFSR), the largest of the 15 Soviet republics. The breakdown among minor administrative units is to some extent of a dual nature: a series of subunits drawn chiefly to serve economic and administrative ends and a series that conforms to ethnic patterns. 10/ Local autonomy, where established, is more form than fact; authority belongs to the highly centralistic Communist Party. In Norway the continental Arctic lands fall entirely within the northernmost province, Finnmark, and are administered along democratic

lines. Norway also administers, under special arrangements, Jan Mayen Island and the Svalbard Archipelago. The unusual sovereignty status and related governmental arrangements applicable to Svalbard warrant special mention.

Norway acquired Svalbard through a 1920 treaty to which the USSR is a party. Under this unique agreement, which called for complete demilitarization, no country (including Norway) may keep under surveillance the activities of the nationals of other treaty signers. Thus the Soviets are free to engage in mining and other activities, including the operation of a fully equipped meteorological station. The 1944 demands of the USSR for additional rights in Svalbard were rejected by the Norwegian Government. Norway's participation in NATO, however, has added new facets to problems of the Svalbard area. Despite an explicit statement that NATO applies to Svalbard only if the neutrality of the archipelago is violated, the USSR in 1951 strongly protested Norway's role in NATO, regarding it as a violation of the demilitarized status of Svalbard. 11/

Svalbard has no place in Norway's system of local government. Norwegian authority in the islands is exercised by a governor, who has wide powers and reports directly to the Norwegian national government. Citizens of the USSR, the only non-Norwegians now in the archipelago in significant numbers, manage their own affairs and have little contact with the Norwegians. Strict interpretation of the Svalbard Treaty would require USSR citizens residing in Svalbard to apply the laws of Norway and to use Norwegian tribunals, but this procedure has not been followed. 12/

B. Sector Claims

Canadian and Soviet sector claims, the only ones made to date in the Arctic, have not yet caused serious international disputes, but they have cast an aura of uncertainty over territorial jurisdiction within the area. The "sector principle" on which the claims are based says, in effect, that all lands discovered or undiscovered, within a spherical triangle formed by the North Pole and the easterly and westerly limits of a country's Arctic Ocean coast, belong to the coastal state concerned or that this state should have at least a preferential right to acquisition.

Canada's sector claim, first set forth in 1925, takes in all islands known or yet to be discovered within the longitudinal limits 61°W and 141°W and extending "right up to the pole." 13/ In 1928 the Canadian Government forestalled possible Norwegian claims to certain areas within the Canadian sector by paying the Norwegian explorer Otto Sverdrup $67,000 "for his services." Norway then recognized the

claim of Canada to the areas in question but specifically declined to recognize the sector principle. In 1955, when a Soviet ice-floe station drifted into the Canadian sector, there was much discussion in official Canadian circles about the meaning of the Canadian sector claim and as to whether the Soviets had "invaded" Canadian territory. In debates that followed, it was brought out that Canada does not claim sovereignty in any form over the high seas within its sector. 14/ Nevertheless, in official Canadian circles the belief seems to be fairly widespread that Canada perhaps should and eventually will exercise some sort of sovereignty over the icecap within its sector. This belief is evidenced by the following comments in a 1954 study of Canadian boundaries:

> Senator Poirier's "sector" [the Canadian sector], therefore, still remains in an indefinite official state, but it has recently come to take on added meaning with the possibility that large areas of sea ice may be used as airfields. If this possibility becomes a reality, then the question of sovereignty over the ice in "Poirier's sector" will no doubt have to be examined, for it will have some of the aspects and uses of dry land. 15/

The Soviet sector claim, apparently inspired by the Canadian, was put forward in 1926. It asserts Soviet sovereignty over all lands and islands discovered or to be discovered in the sector from 32°04'35"E to 168°49'30"W, except that acknowledged to be foreign territory (Svalbard). 16/ In writing on the decree of 1926, Soviet jurists have gone beyond a mere claim to land, claiming as "open polar seas" (that is, seas having a status "nearly identical with that of territorial waters") all water areas within the Soviet sector. 17/ In the opinion of the Soviet jurists, this gives the USSR exclusive right to the airspace above such seas. Whether the writings of these jurists should be viewed as private opinions or as quasi-official statements of Soviet policy is uncertain. Consequently, what the Soviets actually include in the claim for their sector is not known. In the late 1920's, Norway protested the Soviet sector claim because it negated the Norwegian claim to Franz Josef Land. The protest was not advanced vigorously, however, and it is now clear that Norway's claim to Franz Josef Land has been abandoned.

The US, Denmark, and Norway have not made Arctic sector claims and do not recognize such claims or the sector principle. Iceland has no basis for a sector claim, because the easternmost point of Greenland, to the north, extends farther east than any part of Iceland.

In its extensive scientific investigations on the Arctic icecap, the USSR has not treated the claimed or unclaimed sectors of other countries as inviolate. Conversely, it is noteworthy that the USSR apparently did not protest on any of the several occasions in the 1950's when US-manned ice-floe stations circled into the Soviet sector.

Non-Soviet jurists have sharply criticized Arctic sector claims, indicating that the sector principle has no basis in international law. 18/ Proponents of the principle, however, claim among other things that their theory is merely a variation of a common theme in the evolution of boundaries. 19/

C. Territorial Seas and Exclusive Fishing Zones

The territorial seas of Arctic countries present a number of problems, some of which are unique to the northlands, whereas others are Arctic manifestations of world problems of long standing. The key problem of the latter type is the lack of international agreement on the width and method of delimiting territorial seas. The USSR claims a territorial sea 12 nautical miles in width; the US and Canada, 3 miles; Norway and Denmark, 4 miles; and Iceland, 4 miles plus an exclusive fishing zone 8 miles wide. The Soviet territorial-sea claim is confused by (1) the Soviet sector claim and (2) the claim that certain seas along the Soviet Arctic coast have the status of internal waters -- the Kara, Laptev, and East Siberian Seas and part of the Chuckchee Sea. 20/ (See Map 28214, following p. 31.)

Coastal states have exclusive fishing rights in their territorial seas. Any seaward extension of their limits, either directly or by means of special zones such as Iceland's, curtails the fishing rights of other countries. Non-Arctic countries that have long been dependent on northern waters for major portions of their fish supplies are not prone to take curtailment with equanimity. A world trend toward broader territorial seas and exclusive fishing zones was given impetus by the 1951 Anglo-Norwegian Fisheries Case, wherein Norway's method of fixing the baseline for measuring its territorial sea was approved by the International Court of Justice. 21/ The Norwegian method involved the drawing of straight base lines connecting outermost points on the coasts and islands rather than the use of an irregular base line following the sinuosities of the coast. Effects of the trend are demonstrated by the current dispute between the United Kingdom and Iceland regarding the latter's liberally drawn exclusive fishing zone, a dispute which the USSR has been quick to exploit by propaganda and other means. There are indications that Iceland's position or a modification of it may be upheld eventually, but whether settlement in Iceland's favor will ward off or invite similar disputes in other Arctic fishing areas remains to be seen.

The 1958 United Nations Law of the Sea Conference failed to agree on a uniform width for the territorial sea but did adopt rules covering the drawing of the baselines that separate internal waters (no innocent passage permitted) from the territorial sea (innocent passage permitted). Much freedom in the drawing of baselines is still left to coastal states, however, particularly those with deeply indented or island-bordered coasts. The 1958 Law of the Sea Conference also failed to lay down regulations on "historic waters." This question, which was referred to the UN General Assembly for special study, is important since it offers coastal states wide grounds for new and extensive claims. 22/ The Soviet claim to internal-waters status for seas along its Arctic coast seems to be based in part on a "historic waters" argument. 23/ Also noteworthy is the fact that Canada claims Hudson Strait and Hudson Bay as internal waters on historic grounds. 24/ A second UN Law of the Sea Conference, scheduled for March 1960, will attempt to resolve problems that the 1958 meeting left unsolved.

Should international agreement be reached on the width of the territorial sea and related problems, application of the rules to the Arctic will not be simple. In many Arctic areas, ice makes it difficult to fix the location of the shoreline, thus compounding the uncertainty for those attempting to define territorial waters and for navigators attempting to observe limits that have been defined. In general, international legal practice has accepted the principle of ignoring "temporary" ice coverage in delimiting territorial waters but of taking cognizance of "permanent" ice formations such as shelf ice or tongues of glaciers that project into the sea -- that is, treating such projections as land. 25/ The distinction between permanent and temporary coastal ice has its uses and is fairly easy to apply where temporary ice is involved. The permanent category, however, presents problems such as determining whether the ice in question is indeed permanent and dealing with "coastline" changes resulting from the waxing and waning of ice. Theories as to how territorial seas should be delimited in regions of permanent shore ice have had few tests because, in areas where such ice occurs, the need for pinpoint definition of territorial-sea limits has been negligible. The Convention on the Territorial Sea and the Contiguous Zone adopted by the 1958 Law of the Sea Conference makes no provision for ice, either permanent or temporary. It is noteworthy, too, that in preparatory work for the 1930 Hague Codification Conference the problems presented by permanent ice along a coast were dismissed as not ripe for regulation. 26/

To date, disputes over territorial seas in the Arctic, as well as over exclusive fishing zones, have focused mainly on fishery questions. However, the advent of the atomic submarine, which vastly increases possibilities for freedom of movement by sea in the Arctic, sets the stage for problems of a new and more ominous type. Atomic submarines

are uniquely suitable for collecting data in the Arctic and are currently being used for this purpose. Near the uncertain limits of Soviet and non-Soviet territorial seas, this activity holds a potential hazard for serious international incidents. Clear, agreement-backed definition of territorial-sea limits might alleviate the hazard somewhat. On the other hand, it may be felt -- possibly on both sides of the Arctic -- that, for the present, neat legality in the matter of territorial-sea definition would accomplish little and might even prove disadvantageous by closing data-collecting doors that both sides would rather keep open.

D. Installations on Floating Ice

The Soviets pioneered in the development of techniques for landing aircraft on smooth ice floes of the Arctic Ocean and in 1937 established the first ice installation to be occupied on a long-term basis. Since then, seven additional Soviet drifting-ice stations have been manned for periods long enough to warrant calling them "semipermanent," and many other landing sites have been occupied briefly (see Maps 27375 and 27669, following p. 31). Not until 1952 did the US man an ice-drift station on a long-term basis, and the total icecap effort of the West to date apparently has not matched that of the USSR.

To date the drifting of Soviet-manned ice floes into the non-Soviet Arctic sectors (claimed or unclaimed) and vice versa has caused no incidents or diplomatic protests, although the US and the USSR periodically reconnoiter each other's drifting-ice stations from the air. 27/ On or about 11 November 1959 a British newspaper reporter flying from Alaska in a chartered aircraft (presumably US or Canadian) attempted to land at Soviet drifting-ice station North Pole-8. The station personnel waved the aircraft off and blocked the airstrip with vehicles and oil drums. At the time of the landing attempt the location of the drifting-ice station was reported as 78°N-176°W, or about 800 miles south of the North Pole, a position well within the Soviet sector claim but near its eastern limit. Apparently this was the first time an aircraft of Western registry, either military or civil, had attempted to land at a Soviet drifting-ice station. 28/

The legal status of installations on floating ice has long been cloudy. International law, insofar as it has spoken to the problem, seems to regard ice installations as somewhat akin in status to ships on the high seas. 29/ Some drifting-ice stations, both US and Soviet, have been abandoned for periods of varying length and then reoccupied. Whether legal title to supplies and equipment is retained while drifting stations are unattended is a moot question. Thus far, there apparently has been no test case in connection with Soviet- and US-manned drifting stations. On the broader question of whether occupation

of ice floes conveys any sort of permanent sovereignty, the answer of international law seems to be "no." Böhmert, a German legal authority, wrote in 1938:

> In that case [use of an ice floe as an air base or scientific station] sovereignty over such a floe would exist as long as the state authority was actually exercised. If the base were given up, the territory would thereby be relinquished. 30/

Although Böhmert makes light of the idea that scientific and related activities on the Arctic icecap might convey sovereignty, the USSR may conceivably someday point to its numerous icecap landings and drift-station tracks as evidence of effective occupation. Such evidence might be advanced, for example, in an effort to broaden recognition of the Soviet sector claim.

Since World War II the USSR and the NATO countries have developed relatively inexpensive equipment that will, when placed unattended on ice floes, automatically report meteorological and ice data by radio. Under favorable conditions, such stations might remain active for months. 31/ To date, use of unattended equipment in the Arctic has not given rise to international disputes, but the basic question of ownership of unattended equipment on the ice outside territorial waters remains unanswered. As long as automatic reporting equipment handles nothing but weather and ice data, it probably will not cause jurisdictional problems. However, other types of automatic reporting equipment -- for example, early warning devices and submarine detection equipment -- may now or in the not-too-distant future be in use on the icecap. Use of such equipment could lead to delicate incidents or open disputes.

E. Air Space

Some Arctic air-space problems are merely polar-area manifestations of broad patterns of East-West disagreement, whereas others are in some respects unique to the far north. Underlying most problems of both types is the great sensitivity of the USSR about the security of its borders, accompanied by the desire to keep alien influences as far as possible from them.

The USSR, unlike other Arctic countries, is not a member of the International Civil Aviation Organization (ICAO) and does not endorse its principles. The USSR attempts instead to restrict international air commerce in such a manner that it will yield them one-way advantages, a policy most non-Communist countries counter by denying air outlets to Soviet aircraft. Thus, direct air commerce between the

free and Communist worlds is comparatively light and in the Arctic, nonexistent. As long as this impasse exists, little of the potential for transpolar air routes can be realized. 32/

The Soviet sensitivity regarding the frontier holds within it the danger of incidents involving hostile action against Free World aircraft, both military and civil. To date, apparently, only one such incident has occurred within the limits of the Arctic -- the shooting down in 1955 of a US Navy "Neptune" patrol plane near St. Lawrence Island, southwest of Bering Strait. The incident reportedly occurred on the US-Russia Convention line of 1867 but was 20 to 30 miles from the nearest Soviet land. Although the convention line was drawn merely to divide between the US and Russia scattered islands, islets, and rocks in seas not well known in 1867, the USSR seems to have treated the line as if it marked the seaward limit of Soviet territorial waters and air space. The US protested the "Neptune incident" strongly, claiming that the plane had at no time violated Soviet air space. The USSR, in reply, claimed a violation but tacitly admitted to error by expressing regret and offering to pay half the damages, an offer that was eventually accepted. 33/

The Arctic area in which disagreements over air-space limits might cause incidents includes most of the area along the 1867 convention line and the full sweep of the Soviet sector claim. How seriously the "exclusive air-space" feature of the Soviet sector claim should be regarded is a moot question. If the writings of Soviet Arctic specialists such as V. Lakhtin are taken at face value, exclusive air space is definitely claimed. 34/ On the other hand, US military aircraft supplying drifting-ice stations and conducting ice reconnaissance have penetrated the Soviet Arctic sector on many occasions without causing incidents. In April 1958, however, the USSR submitted to the UN Security Council a note calling for "urgent measures to put an end to flights by United States military aircraft armed with atomic and hydrogen bombs in the direction of the frontiers of the Soviet Union." 35/ The US countered this move by proposing an Arctic inspection zone.

The only transpolar route now being flown by civil air lines is the Europe-Alaska-Japan route flown by the Scandinavian Airlines System (a Danish-Swedish-Norwegian consortium) and by Air France. In flying across the polar area, both airlines deviate from great-circle courses in order to avoid Soviet territory. To date, no incidents have occurred.

The Soviet sector claim is sometimes cited as a reason why extensive transpolar flying by civil aircraft of the West may not be possible in the foreseeable future. 36/ This interpretation, however, is somewhat misleading. The Soviet Arctic coast forms a broad arc that

partly encircles the pole. A line connecting the ends of the arc would take in the bulk of the Soviet sector claim. Thus, the air space within the Soviet sector claim -- free or otherwise -- will have virtually no importance to commercial aviation of the West until aircraft are permitted to fly over the coast itself.

F. Politico-Legal Status of US Arctic Bases in Foreign Countries

US military bases in Canada, Greenland, and Iceland pose potentially complex jurisdictional and policy problems. Despite careful handling of relations with host countries, some of the people within these countries feel that the presence of US bases is an infringement of their independence. Legally, sovereignty over base areas is retained by the host countries, but the agreements with these countries have not yet been put to severe tests in the Arctic, and the agreements themselves offer potential grounds for many misunderstandings. Possibilities for discord are augmented by the current stage of technological development, in which equipment becomes obsolete quickly and host governments cannot always be completely informed regarding work underway on new weapon systems. The USSR is keenly aware of the political problems presented by US bases on foreign soil and misses few opportunities to aggravate them, as in the case of Iceland.

III. Special Problems With Jurisdictional Implications

A. Conceptional Disagreement

A basic clash of conceptions underlies many current problems of political control in the Arctic. According to the long-standing view of international law, the Arctic Ocean outside a "reasonable" territorial-sea belt has high-seas status, regardless of ice mantle. Opposed to this is the view that the Arctic is a unique region so different in important ways from the rest of the world that it requires special adaptation of laws to deal adequately with its problems.

The US, Norway, and Denmark adhere to the first point of view, as also does Canada -- but with some leanings toward the second concept. 37/ The second point of view has been put forward in the quasi-official writings of Lakhtin, Vyshnepolsky, and other Soviet Arctic experts. The Soviet Government has not followed up these writings with official decrees; but, on the other hand, it has not repudiated them. 38/

There seems to be a tendency in the West to take the Soviet view lightly, even though its keynote -- the unique character of the Arctic -- actually seems to have been reinforced by recent developments. For example, the Arctic Ocean, unlike any other area of similar size on the earth's surface, has many characteristics of both land and sea.

The Arctic Ocean can be navigated to some extent by surface vessels and, with little restriction, by atomic submarines, yet land vehicles are used on its surface to construct airfields and semipermanent installations.

B. Inspection Zones, Demilitarization, and Internationalization

Because of the role of the Arctic as a buffer between sharply divided blocs, consideration has been given to various types of special status for the area -- ranging from "inspection zone" through "demilitarization" to "internationalization." Details of the different schemes that have been advanced vary, but all point toward establishment in the Arctic of mutually acceptable safeguards against surprise attack. It is generally accepted that agreement on an inspection arrangement must come first and that, until such an agreement is reached, discussion of demilitarization or internationalization schemes is pointless. Thus, to date, proposals applicable to the Arctic have focused mainly on the inspection aspect, but no inspection or related arrangements have been agreed upon.

One of the most concrete proposals to date was that placed before the UN Security Council on 29 April 1958 by the US. It called for an inspection zone that would include (1) all territory north of the Arctic Circle belonging to the USSR, Canada, the United States (Alaska), Denmark (Greenland), and Norway; (2) all territory of Canada, the United States, and the USSR west of 140°W, east of 160°E, and north of 50°N; (3) all of the remainder of the Kamchatka Peninsula; and (4) all of the Aleutian and Kurile Islands. 39/

The proposal was advanced as a desirable prelude to disarmament rather than as disarmament itself. In many countries, the "first step toward disarmament" aspect had strong appeal; and the belief was widespread that the plan would reduce tensions and build international confidence. 40/ The plan, however, was vociferously rejected by the Soviets who claimed, among other things, that it was merely a scheme to aid the intelligence-collecting activities of the West.

Since April 1958 the inspection-zone proposal has been restated a number of times by Western spokesmen, with a few variations but no basic change in the original concept. For example, the offer made by Prime Minister Diefenbaker of Canada to Khrushchev in 1959 stated that "He [Khrushchev] can inspect any area in Northern Canada which he designates as being used for aggressive purposes by the United States provided he lets us inspect all areas in the USSR within the same latitudes." 41/ The recent signing of a treaty providing for nonmilitarization of Antarctica insured by inspection may provide opportunity for proposing a somewhat similar arrangement applicable to the Arctic.

C. East-West Cooperation in Arctic Research

Over the years, direct cooperation between the USSR and other countries with Arctic research interests has been slight, and in such matters as publication of findings the USSR has been anything but open handed. 42/ Soviet participation in the Arctic phase of the International Geophysical Year (IGY), 1957-58, represented a noteworthy break in this pattern. In those portions of their over-all Arctic program that were announced as part of the IGY program, the Soviets showed the cooperation required within the concept of the IGY. A complete inventory of Soviet-released Arctic IGY data is not yet possible, but it is believed that the USSR will release data strictly within the limits of its stated program and IGY agreements. 43/ Although the USSR's past record of cooperation in Arctic research is not too promising, some countries, particularly Canada, have looked hopefully to inter-Bloc scientific cooperation in the Arctic as an antidote to the hostile atmosphere that pervades the area. The argument is advanced that cooperation involving, for example, exchange of experts might be an effective stepping stone toward Arctic inspection arrangements (see Section III B) and eventual demilitarization or internationalization. To this end, Canada has repeatedly proposed USSR-Canada exchanges of Arctic data and experts but, until recently, without evoking a response. In 1959, however, while visiting the US, Khrushchev indicated that he would consider increased Canada-USSR exchanges of Arctic knowledge. 44/ Whether anything will come of this hint, lightly dropped, is still uncertain. A change may be imminent, but past Soviet performance gives little reason to see in joint Arctic scientific activity an open road to rapprochement.

D. Arctic Warming Schemes

Plans for warming the Arctic Ocean are still in a highly conjectural stage, but the advent of atomic power takes some of the component ideas out of the fantasy class. Several methods of bringing about the desired warming have been considered -- the diversion of rivers to reduce salinity, ocean current diversion, mechanical and nuclear destruction of ice, and speeding the melting rate of ice by spraying it with dark substances or chemicals. If implemented on a large scale these and similar schemes would pose complex political problems since their influence, favorable or otherwise, would not stop at national boundaries. 45/

The USSR is vitally interested in warming the Arctic and would gain much from a successful plan. An approach recently given considerable attention in the Soviet press proposes that warming be accomplished by building a dam across Bering Strait and manipulating the interoceanic water exchange. Western scientists who have considered

the several variations of this scheme generally have taken a dim view of it, claiming that many years will elapse before hydrometeorological knowledge is far enough advanced to permit sound assessment of the effects. P. Borisov, the principal Soviet advocate of the Bering Strait scheme, estimates the cost of the dam at about $17 billion. 46/ Since 1955 the Bering Strait scheme has been the subject of numerous articles in Soviet publications, mostly glowing accounts of the benefits with few technical details. Lately, a few dissenting voices have been raised by Soviet scientists. 47/ Whether more Soviet scientists would object in print if given the opportunity is uncertain.

Although evidence is not strong encugh to rule out the possibility that Soviet scientists are considering the Bering Strait scheme at least semiseriously, it seems possible that the scheme was selected by nonscientists for publicity emphasis because certain features have propaganda value.

E. Arctic Use and Testing of Scientific-Military Devices

To date, the use and testing of scientific-military devices in the Arctic does not seem to have caused acute problems, although the potential for disputes and disagreements that such activity presents is considerable.

The USSR has tested many nuclear devices in the Arctic in the vicinity of Novaya Zemlya, a testing area to which it turned as newer and more powerful weapons were developed. 48/ This testing caused considerable concern in the countries of northwestern Europe, and press accounts reported that fallout over Scandinavia increased significantly. 49/

In April 1959, a brief, frenzied search was made for the nose cone of a US missile that may have come to earth in the Svalbard area. Although there was considerable newspaper speculation as to whether the container had fallen into Soviet hands, the incident did not reach critical proportions. It does, however, point to a type of problem that could become more common as missile and earth-satellite activities increase. 50, 51/

Western and Soviet electronic measures and countermeasures in use and being developed for use in the Arctic hold some possibilities for dispute. Such activities as experimentation with radar-deception techniques, the transmittal of misleading navigation signals, and certain types of monitoring and jamming of communications could cause incidents. That electronic measures and countermeasures figure importantly in plans for the Soviet Arctic is evidenced by the operations of Soviet "trawlers" off Newfoundland, Iceland, Greenland, and Norway.

It has been fairly well established that some of these craft are Soviet Navy auxiliaries whose primary purpose is the collection of electronic intelligence. 52/

To date, the electronics "war" has been largely a secret conflict receiving little open discussion. International jurisprudence does not and, to a considerable extent, cannot speak directly to the fast-changing problems presented by electronics.

IV. Prospects

A. Trends

Technological advances of the last 15 years have greatly improved prospects for the use and development of the Arctic, and there is no reason to believe that the progress of the next 15 years will be any less revolutionary. Strategic and scientific considerations, population pressure, and a northward-pushing quest for food and raw materials -- particularly minerals -- seem certain to draw the Arctic region increasingly into world affairs. The environment-adapted way of life of the aboriginal peoples seems headed for extinction. The rich fisheries of the Arctic are likely to decline in importance if conservation measures are not applied. Although the development of such measures might encourage international cooperation in the Arctic, it could just as easily lead to disputes. The full potential of trans-polar commercial air routes cannot be realized in the present two-world political atmosphere. The great interest of the USSR in Svalbard and northern Scandinavia has long presented and will continue to present a delicate situation worthy of careful monitoring. Arctic warming schemes pose complex legal, military, economic, and psychological problems between East and West. Inherent in the use and testing of scientific-military devices in the Arctic is a considerable potential for disputes and incidents. The same is true of the flying by NATO aircraft near the doubtful limits of Soviet air space. The presence of US Arctic bases in foreign countries creates problems that the USSR will continue to exploit. Because the importance of Arctic data to science seems certain to increase, Soviet attitudes toward sharing or withholding such data will warrant close study since both may serve as indicators of scientific trends.

B. Outlook for Resolving Jurisdictional Problems

Many of the territorial and related problems of the Arctic are rooted deeply in East-West distrust, and the likelihood that they can be eliminated any faster than the distrust itself seems slight. Of the many Arctic problems, those pertaining to territorial seas, sector claims, and air space now seem to be most critical because they cast

uncertainty over long lines of NATO-USSR contact. 53/ Also potentially troublesome is the question of the legal status of installations on floating ice. These installations seem to call for new legal concepts; but the development of such concepts may weaken the high-seas status of the Arctic and strengthen the Soviet concept that the region is unique, calling for special frames of reference in international law.

Discussions of "solving" the territorial problems of the Arctic generally revolve around two approaches: (1) the achievement of successive agreements on specific issues such as territorial seas, and (2) the achievement of a massive, across-the-board international solution similar to that worked out for Antarctica -- the key feature to be an inspection zone that would include, as a minimum, substantial sections of the Arctic lands of the USSR and of the Western nations.

What would be accomplished by following the first approach is open to question.* Although this approach attacks no basic causes, it might pave the way for talks on problems of the Arctic. The second or inspection-zone approach seems on the face of it to hold promise for alleviating some of the problems and perhaps placing others in abeyance, as in the case of territorial claims in the Antarctic. The arriving at an inspection-zone "solution" for the Arctic, however, will be a vastly more complex matter than it was for the Antarctic.

Previous efforts to set up northern-hemisphere inspection zones, either through general disarmament talks or discussions keyed specifically to the Arctic, have come to naught. The Soviet signing of the Antarctic treaty may have brought the USSR a little nearer to acceptance of the inspection principle, as may also the Soviet "package plan" for a nuclear-test ban backed by inspection. 54/ On the other hand, the pace of technology may outmode inspection plans faster than they can be devised. Thus, many of the dangers and uncertainties that the Arctic presents are likely to be enduring.

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* In part, this approach will be followed by the 1960 UN Law of the Sea Conference, but on a world basis, with no special emphasis on the Arctic as far as can now be foreseen.

APPENDIX A

SUPPLEMENTARY INFORMATION

1. Strategic Areas

Although military threats can no longer be confined sharply to particular points or lines, some areas within the Arctic are of more than passing military importance. The most significant of these are described briefly in the following paragraphs.

The Murmansk area is the only naval-base area that provides Soviet vessels free access to the open ocean throughout the year. 55/ Also near Murmansk are forward staging areas of the Soviet air force and a network of important radar, navigational, and communication facilities. The USSR is much concerned about the north coast of Norway because it flanks the sea access route to Murmansk and has repeatedly warned Norway about the "dangers" of allowing NATO bases on its soil.

Svalbard, which is Norwegian territory, is not under the effective control of either the US or the USSR. This archipelago, however, occupies a key position because of its flanking location along the sea route to Murmansk and because of its proximity to both Western and Soviet bases. The islands have port facilities that could be adapted to serve light naval craft, a navigation season 5 to 6 months long, and potential airfield sites. 56/

Franz Josef Land, the northernmost of five Soviet Arctic archipelagos, is important mainly because it is only 1,500 miles from the US base at Thule, Greenland, and because it is located astride major great-circle routes between the US and the USSR. 57/ Scientific stations and at least two airfields are located in the archipelago. The current military uses of the islands are limited by terrain (ice plateaus), fog, strong winds, and a short navigation season lasting only 2 months.

Greenland occupies an important position between northeastern North America and northwestern Eurasia. It is relatively close to North Atlantic shipping lanes and lies athwart great-circle routes between the industrial centers of the US and the USSR. The terrain and climate do not favor large-scale military deployment, but permanent ports, airfields, and electronic facilities have been established in a number of places. Ports on the southwest coast are ice-free throughout the year. 58/

Iceland, accessible by sea on a year-round basis, is a critical link between North America and Eurasia. Important great-circle routes such as that from Moscow to Pittsburgh pass squarely over Iceland; and from the shores of Iceland much of the North Atlantic, including Soviet access waters between Norway and Greenland, can be controlled. The USSR would like to eliminate the US base on Iceland and is attempting to accomplish this end through propaganda and economic penetration. Iceland has no armed forces. Currently the enthusiasm of Iceland for NATO is tempered by the fisheries dispute with the United Kingdom. 59/

Bering Strait is the only sea link between the Arctic and Pacific Oceans. It is therefore important to the USSR as the eastern outlet of its Northern Sea Route. To the Western nations, Bering Strait is a critical sector of the sea supply route of Dew Line and other Arctic installations. The strait is 50 miles wide at its narrowest point. Near the middle and little more than a mile apart are the Diomede Islands, one of which belongs to the US and the other to the USSR. Nowhere else is US territory so close to that of the USSR. Although military installations are not heavily concentrated in the immediate vicinity of Bering Strait, a number of airfields, weather stations, and other installations are located nearby on both the US and Soviet sides of the strait. The shallowness of Bering Strait (maximum depth 171 feet) and of its approaches impedes under-ice movement of atomic submarines between the Arctic Ocean and the Pacific. 60/

2. Military and Scientific Developments

Soviet scientific activity in the Arctic exceeds the combined activities of the NATO countries and constitutes a phase of the broad, integrated Soviet attack on the basic physical problems of the earth, an attack that also includes the study of the Antarctic and other parts of the world. The USSR has charted and scientifically investigated more than 2 million square miles of the Arctic Ocean and has made hydrographic surveys within 30 miles of Canada's Arctic islands. 61/ The Soviet research effort embraces the whole environment of the earth from ocean bottom to upper atmosphere and has economic and strategic as well as scientific implications. The benefits to shipping along the Northern Sea Route and to civil air transport are obvious, but the data assembled will also be of use in military flying, submarine operations, and missile activity. For example, polar weather forecasting in support of civilian activities could also serve military ends. Similarly, knowledge of underwater topography, sea currents, and ice movement is essential to submarine operations, and gravity data are important to long-range missile guidance. The USSR has about 100 polar stations on its coasts and islands and has thus far manned 8 stations on drifting pack ice. The importance of the Arctic to the USSR is illustrated by the fact that the first atomic-powered vessel

developed was an icebreaker -- the 16,000-ton Lenin, which is now undergoing sea trial. Vital to all Soviet activity in the Arctic are the developments in the fields of winterization of aircraft and land vehicles, special fuels and lubricants for Arctic use, and techniques for stabilizing permafrost. It is noteworthy, too, that the USSR has exploded a number of nuclear devices in the Arctic under varied conditions. 62/

Strategic considerations have given impetus to Western efforts to catch up with the USSR in the understanding of the Arctic environment and in the technical knowledge required to cope with it. Although the day of catching up now seems distant, substantial progress has been made. Many little-known lands and waters have been surveyed, and such work is continuing in the Canadian and Greenland sectors of the Arctic in support of construction and maintenance of warning networks and other installations. A system of weather stations -- US, Canadian, Danish, Norwegian, and joint -- has been established, and work is underway on the automatic recording and broadcasting of weather and ice data. A semimobile nuclear powerplant being developed in the US for polar-area use may provide a solution to critical problems of Arctic logistics. 63/ The speed and relative freedom with which atomic submarines can move within the Arctic Ocean make it possible for these vessels to collect in a short time information that would require years to assemble by other means. The West's lead in atomic submarines therefore offers significant opportunities for the collecting of data. Although the Soviet icecap-research effort has not been matched, US personnel have occupied stations on floating pack ice. Currently the US and Canada are cooperating in the exploration of the ionosphere over the Arctic, using rockets and satellites -- a line of research expected to improve understanding of the special behavior of electronic devices in northern latitudes. 64/ Canada's Arctic research plans will be furthered in 1960 by the addition of a new 3,380-ton diesel-powered icebreaker to its current fleet of six small icebreakers. 65/ Norwegians and nationals of many other countries have engaged in a wide range of scientific investigations in Svalbard. Danish scientific work in Greenland has been directed mainly toward mapping, meteorology, and geology. Among the Western countries, continuing research is underway on such basic cold-weather problems as aircraft and land-vehicle winterization; sled-train equipment; permafrost; and the effects of Arctic cold on fuels, lubricants, explosives, and other materials.

It is possible that Western and Soviet scientific breakthroughs may suddenly change some long-established concepts as to what is or is not possible in the Arctic. For example, developments leading to even moderately effective weather-control techniques would have far-reaching Arctic implications.

APPENDIX B

GAPS IN INTELLIGENCE

The main gaps in intelligence data on territorial and sovereignty problems of the Arctic concern Soviet plans, intentions, and policy positions, particularly as related to claims (sector, territorial sea, air space). Also lacking is information on the current Soviet legal conception of the Arctic ("unique region" versus high-seas status) and Soviet official views concerning the legal status of installations on floating ice. Similar information reflecting current Soviet thought in regard to Arctic inspection-zone and demilitarization plans are also needed. More information is desirable concerning Soviet scientific-military activities in the Arctic, especially Arctic warming and climate-control schemes.

APPENDIX C

SOURCE REFERENCES

25X1C

This study is based on finished intelligence reports, State Department despatches and miscellaneous communications, US Air Force reports and bulletins, US Senate documents, and [redacted] publications. Also used as sources were numerous studies published as unclassified books and pamphlets, articles in periodicals and newspapers, and standard reference works. The bibliography includes only selected items used in writing the study.

Evaluations following the classification entry and designated "Eval" have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document. Standard reference works, newspaper articles, and certain other items not susceptible of evaluation have not been given an evaluation symbol.

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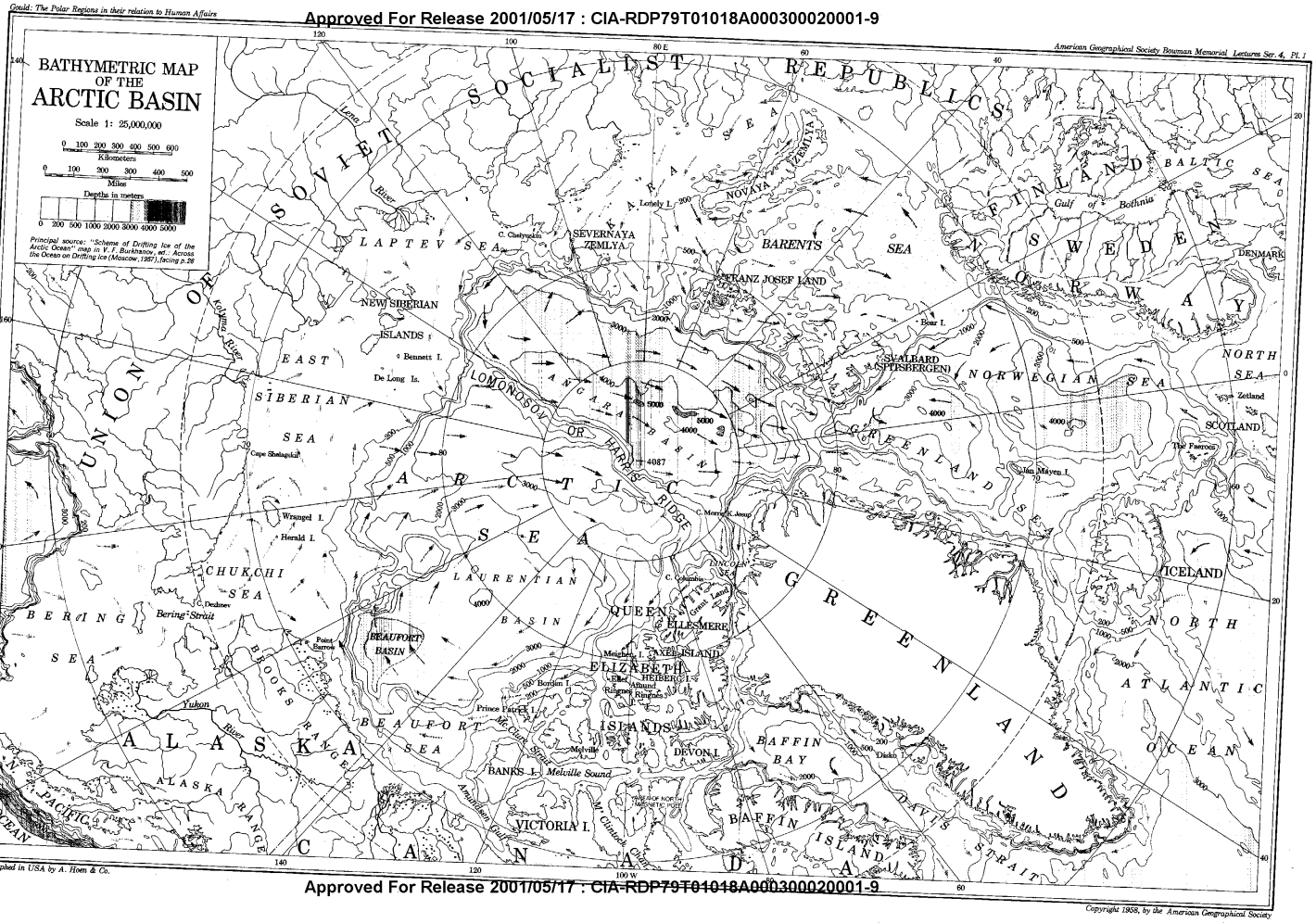

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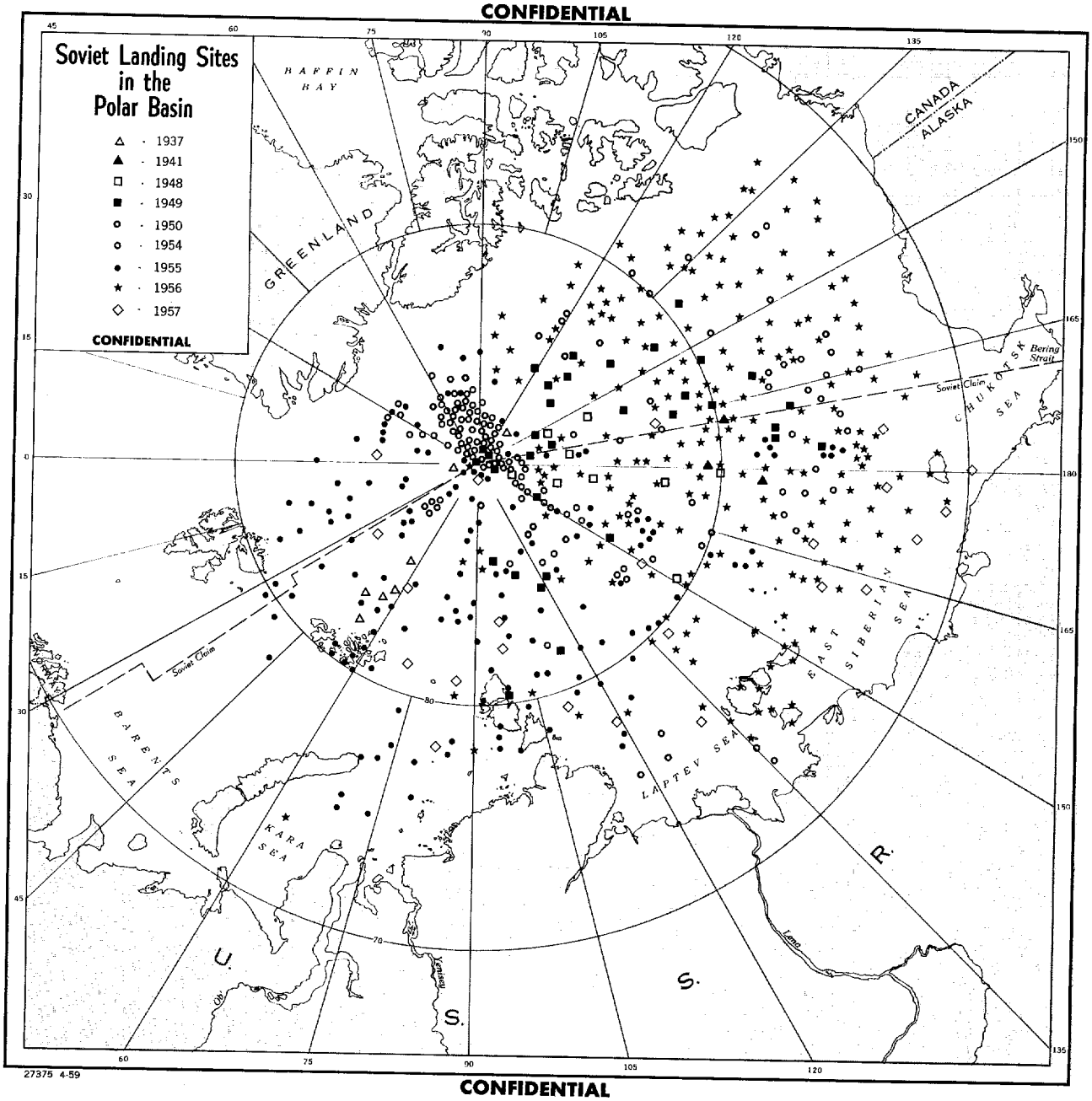

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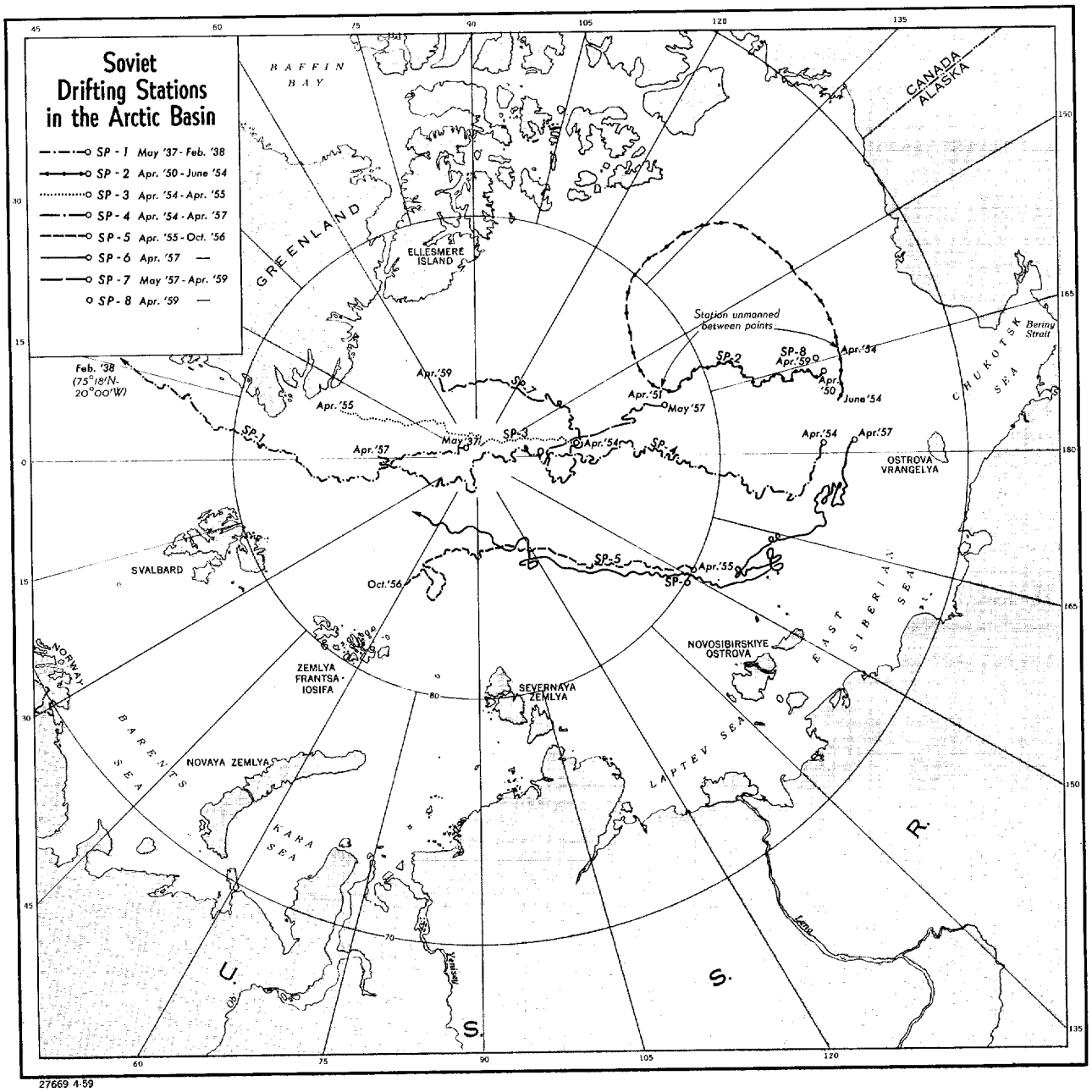

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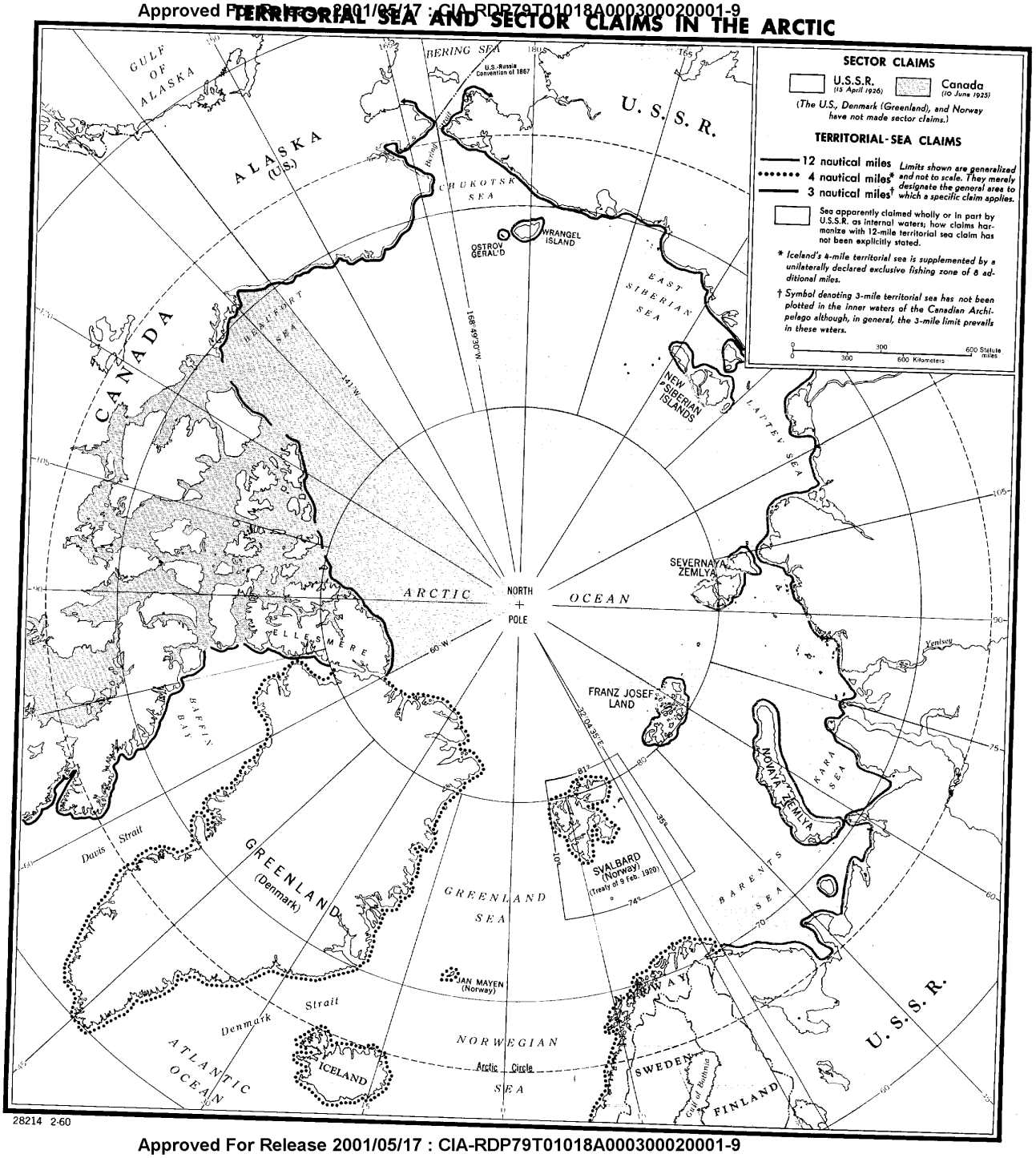

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