CSC 7-27-0-1

6M—4-50 (3198)
H.Q. 224-15-8

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SECRETARY, CHIEFS OF STAFF COMMITTEE

DEPARTMENT OF NATIONAL DEFENCE, OTTAWA

SUBJECT **SOVIET CAPABILITIES FOR NORTHERN OPERATIONS**

Jan 17 - 1952

10

FOR CROSS REFERENCES SEE INSIDE COVER

DIRECTED TO				DIRECTED TO				DIRECTED TO			
REGISTRY POINT	STAFF OFFICER, P.A. OR B.F.	DATE	INITIALS	REGISTRY POINT	STAFF OFFICER, P.A. OR B.F.	DATE	INITIALS	REGISTRY POINT	STAFF OFFICER, P.A. OR B.F.	DATE	INITIALS
JIC		23 Jan	J.D.								
JIC		25 Jan	J.D.	Jic	J.63	28 Nov	Y.L.				
					PA	25 Nov	[illegible]				
Jic 8th	B7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
						27 Nov	[illegible]				
Jic	B7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
JIS	[illegible]	[illegible]	[illegible]	Jic	[illegible]	[illegible]	[illegible]				
Jic JIC		11 Jan - 11.			PA	10 Jan	JP				
JIC				JIC	Legnet	30 Dec	6K				
Jic	B7	30 January		Cancelled.							
				Jic	J.75	15 Jan	Y.L.				
JIC		24 July	6K		PA.	15 Jan	[illegible]				
				Jic	78	24 Jan	Y.L.				
Jic	B7	28 Jul	Y.L.		B7						
	PA	28 Jul	[illegible]	Jic	B7	28 Jan	Y.L.				
Jic	B7	8 Aug	Y.L.		PA	28 Jan	JP				
JIC	BF	26 Aug	[illegible]	JIC		20 Feb	[illegible]				
JIC	B7	26/8/52	[illegible]	JIS		20 Feb	[illegible]				
JIC	BF.	15 Sep	[illegible]		PA	21 Feb	JMS				
Jic 8th	B7	15 Sept	Y.L.								
	PA	15 Sep	[illegible]								
JIC		23 Oct	[illegible]								
JIS		23 Oct	[illegible]								
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CSC 7.27.0.1 SOVIET CAPABILITIES FOR NORTHERN OPERATIONS

CROSS REFERENCES

FILE No.	SUBJECT

FILE NO. 7.27.0.1

SOVIET CAPABILITIES FOR NORTHERN OPERATIONS

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JIC	B7	29 July	YL	29 July	YL
JIC	B7	8 Aug	YL	8 Aug	YL
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JIC		26 Aug		26	
JIC	B7	15 Sept	YL	15 Sept	YL
JIC	III	23 Oct		24 Oct	YL
JIS		24 Oct	YL	12 Nov	YL
JIC		6 Nov	GK	19 Nov	
JIC	Mail	25 Nov	YL	25 Nov	YL
JIC	III	26 Dec		27 Dec	YL
JIS		27 Nov	YL	2 Dec	YL
JIC	Reg	8 Dec	YL	10 Dec	
JIC	Reg	30 Dec	GK	14 Jan	YL
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DATE 9 Feb 53

CHECK DOCUMENTS LISTED BELOW, SIGN, AND RETURN TO CONSIGNOR UNIT

COPIES	FORM	DESCRIPTION
25		Copies 103-127 of JIC 61/1(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic".

(As requested)

PA 7-27-0-1

RECEIPT ACKNOWLEDGED

UNIT DATE

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FROM, AND RETURN TO:

UNIT Joint Staff (JIC) Room 4A41, "A" Bldg.,

SIGNATURE (J.E. Beswick) RANK Major

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DEPARTMENT OF NATIONAL DEFENCE

ARMY Ref: JIC 61/1 (52) - Soviet Technical & Tactical Capabilities for the Conduct of Military Operations in the Arctic & Sub-Arctic

OTTAWA, CANADA,

SC / IS

FEB 20 5 38 AM

16 February 1953.

Secretary,
Joint Intelligence Committee,
Room 4441, 'A' Bldg.,
N.D.H.Q.,
Ottawa, Ontario.

WEAPON EFFECTIVENESS OVER SNOW

1. Para. 3(b) of the above-referenced paper states that "snow cover reduces the effect of fire of weapons which burst on contact with the ground". This is in conflict with the results of CAORE Report #1, dated 29 Jan 51. This latter report notes that the effect of snow is to level off the surface of the ground by filling in depressions. This results in improved overall performance.

2. It is suggested that, in future reports, this aspect might be brought forward.

(E.C. Mayhew) Colonel
Director of Armament Development

SECRET

NAT. DEF. A-168-A
500M—4-46 (9044)
H.Q. 1772-39-376

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2		Copies 101-102 of JIC 61/1(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic".

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COPIES	FORM	DESCRIPTION
2		Copies 99-100 - JIC 61/1(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic".

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TO: [redacted] DMI

FILE OR SERIAL NO. 3949

DATE 28 Jan 53

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COPIES	FORM	DESCRIPTION
3		Copies 94-96 of JIC 61/1(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic".

RECEIPT ACKNOWLEDGED

UNIT DATE

SIGNATURE RANK

FROM. AND RETURN TO:

UNIT Joint Staff (JIC)
Room 4A41, "A" Bldg.

SIGNATURE (J.E. Beswick) RANK Major

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JIBS 266-2000-1

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MEMORANDUM

Ottawa, Ontario,
24 January, 1953.

Secretary, J.I.C.

In accordance with your memorandum of 13 January (CSC 7-27-0-1), would you please send two extra copies of JIC paper 61/1 (52), entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic", for use and retention by JIB.

E. Wathen
for
(I. Bowen)
Director
Joint Intelligence Bureau.

EMW/4080/fc.

RCAF G11
500M-10-50 (6553)

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DATE 23 Jan 53

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COPIES	FORM	DESCRIPTION
1		Copy No. 92 of JIC 61/1(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic".

PA 7-27-0-1

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UNIT DATE

SIGNATURE RANK

FROM. AND RETURN TO:

UNIT Joint Staff (JIC) Room 4441, "A" Bldg.

SIGNATURE (J.E. Beswick) RANK Major

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QUOTE NO. HQTS 9047-34/342 (MI-Int)

DEPARTMENT OF NATIONAL DEFENCE
ARMY

SECRET

OTTAWA, CANADA, 15 Jan 53

Secy
JIC

Soviet Capabilities for Arctic Operations
JIC Paper 61/1(52)

1 Your CSC 7-27-0-1(JIC) d/13 Jan 53. 374

2 DMI would be pleased to receive an additional two copies of this paper.

(NS Cuthbert)
Colonel
DMI

CSC / IS
JAN 15 4 03 PM
JIC
7-27-0-1

IN REPLY PLEASE QUOTE
NO. CSC 7-27-0-1 (JIC)

CANADA

Department of National Defence

SECRET

JOINT STAFF

JOINT INTELLIGENCE COMMITTEE

ADDRESS REPLY TO
CHAIRMAN,
CHIEFS OF STAFF,
OTTAWA

13 Jan 53

MEMORANDUM FOR THE JIC:

Soviet Capabilities for Arctic Operations

1. Copies of paper JIC 61/1(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic" were distributed to members of the JIC with memorandum CSC 7-27-0-1 (JIC) of 9 Dec. A large number of additional copies of this paper are available and if the services require more copies, may I please be notified by 27 Jan.

(J.E. Beswick)
Major,
Secretary.

JEB/5459/fp

CSC 7-27-0-1 (JIC)

SECRET

13 Jan 53

Chairman,
Canadian Joint Staff,
LONDON, England.

Chairman,
Canadian Joint Staff,
WASHINGTON, D.C.

Soviet Capabilities for
Arctic Operations

1. The Joint Intelligence Committee has prepared a paper entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic" for the information of training, operations, planning, and research and development staffs.

2. A copy of this paper (JIC 61/1(52)) is attached for the information of the Joint Staffs.

(H.S. Rayner)
Commodore, RCN,
for Chairman, Chiefs of Staff.

Enc.

JEB/5459/fp

CSC 7-27-0-1 (JIC)

SECRET

JOINT INTELLIGENCE COMMITTEE

12 Dec 52

DAI

Soviet Capabilities for
Arctic Operations

1. Further to memorandum CSC 7-27-0-1 (JIC) of 9 Dec with which I sent DAI copies of the paper JIC 61/1(52), I enclose six additional copies of the paper for:

Training Command
Air Transport Command
Air Materiel Command
Maritime Group
Training Group
12 Air Defence Group.

(J.E. Beswick)
Major,
Secretary.

Encs.

JEB/5459/fp

CANADA

IN REPLY PLEASE QUOTE
NO. CSC 7-27-0-1 (JIC)

Department of National Defence

SECRET

JOINT STAFF

JOINT INTELLIGENCE COMMITTEE

9 Dec 52

G. de T. Glazebrook, Esq., #1-2
Dept. of External Affairs.
DMI #3-27
DAI #28-34
DNI #35-46
DSI #47-76
RCMP #77-78
JIB #79-80

Soviet Capabilities for Arctic Operations

1. Enclosed are copies of the paper JIC 61/1(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic" for distribution within the services in accordance with the list which was approved at the 331st meeting of the JIC.

2. Additional copies of this paper are available.

(J.E. Beswick)
Major,
Secretary.

Encs.

JEB/5459/fp

SECRET

JIC 61/1(52)

December, 1952

Copy No. 81

Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic

CONTENTS

NOTE: Grateful acknowledgement is made to a recent US study, on the content of which a large part of the material in this paper has been based.

10

SECRET

December, 1952

JIC 61/1(52)

Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic

INTRODUCTION

1. This paper discusses the capabilities of the Soviet Union to conduct military operations in an Arctic or sub-Arctic environment - either in the Soviet Union itself, or in North America. Soviet capabilities are not related in this paper to such factors as numbers of suitably trained troops available: the discussion is confined to technical and tactical matters.

2. For the purposes of this paper the Arctic is defined as the area north of the continental tree line (or, for naval purposes, that sea area in which ice is a serious barrier to navigation). The sub-Arctic is defined as the area between the continental tree line and the extensively settled zone. On the basis of this definition, about three-quarters of the Soviet Union is sub-Arctic, extending south from the tree line to about 60°N. (the latitude of Leningrad) in European Russia, and to the border of the Kazakh SSR and the border of the Soviet Union in Asiatic Russia.

CHARACTERISTICS OF THE ARCTIC AND SUB-ARCTIC

3. The following characteristics of the environment will influence operations:

(a) Extreme Cold. The effects of extreme cold will be reduced by proper planning for and provision of suitable clothing, equipment, shelter, means of transportation, supplies, and means of evacuation. The effects of extreme cold on men, material and weapons will slow activity. These factors must be taken into consideration in time and space calculations.

(b) Snow Cover. Arctic regions are not associated with extreme snowfall. Rather, snowfall is relatively light, except in areas adjoining open water. In many areas the total snowfall during an average winter will probably not exceed one or two feet and windswept areas may be bare of snow. Nevertheless, snow cover, where it occurs (particularly in the sub-Arctic), aids the normal movement and operations of troops suitably equipped and trained, but reduces mobility for troops lacking proper equipment and training. While it makes concealment more difficult, snow correspondingly facilitates deception and changes the contours of the ground. Snow cover reduces the effect of fire of weapons which burst on contact with the ground.

(c) Seasonal Transition and Variability of Weather

(i) Sudden changes in weather are common. These changes include severe frosts, mild weather, sudden freezing, snowstorms, strong winds, and dense fogs. Accurate weather forecasts are essential to guard against harmful effects and to enable tactical advantages to be seized.

(ii) Major problems arise during the thaw period. The difficulties of movement progressively increase as the ice of waterways weakens and breaks. Temporary winter roads and airfields disintegrate; permanent ones may become unusable. Rivers flood. Careful planning and provisioning to counteract or surmount difficulties arising from such factors are essential if forces are not to be immobilized for periods up to several weeks. Winter field fortifications become unusable and must be replaced by construction suitable for the summer months. Camouflage must be altered. In winter the main requirement of clothing and shelter is to protect against the cold; in summer it is to give protection against wet and against insects.

(iii) Operations during the summer in the sub-Arctic do not differ materially from operations in other undeveloped regions. In the Arctic, extensive areas underlaid by permafrost become bogs in summertime. Long hours of daylight decrease the possibility of surprise. Insects may cause physical discomfort to troops and may make special protective measures necessary.

(iv) The "freeze-up" season has less effect on land movement than the "break-up". It is often well into the New Year, however, before heavy aircraft can land on sea ice and before trucks and tractors can move freely.

(d) Sparse Settlement. Industries, supplies, quartering facilities, and lines of communications are limited. Their control or destruction becomes important during the winter. Facilities for replacement are negligible. In areas where indigenous population is lacking, military personnel will have to perform tasks for which civilians are used in other areas, e.g. construction of roads. The existence of an acclimatized population subject to discipline in Soviet labor camps in Northern Russia should, however, be noted.

(e) Roads and Railways. In most areas roads and railroads are almost non-existent. In permafrost areas construction is difficult and maintenance requirements are very large. The lack of stone or gravel in some areas is a handicap to rail and road construction. Traffic interruptions due to seasonal changes or bad weather can be anticipated.

(f) Forested Areas. Large forested areas in the sub-Arctic have a great effect upon operations. They offer concealment and give reasonable protection against bad weather, but troops require special training to move, live, and operate effectively in these areas. Forest fires are easily caused in sub-Arctic forests in summer and require special attention.

(g) Numerous Lakes and Waterways. When these are frozen (for about 6 to 8 months of the year), they often provide a good road system, and natural airstrips, although pressure ridges may form a considerable hazard on the larger lakes and along the sea coast. In summer, waterways may be the only surface means of transportation available.

(h) Lack of Maps. For large areas, maps are often non-existent or unreliable. This makes operational planning difficult and requires special emphasis on reconnaissance and navigation. The importance of air photos increases.

(i) Difficulty of Navigation. Difficulty of navigation is caused by magnetic disturbances (although less frequently in Siberia than in North America), and lack of identifiable features. Special navigation equipment and guide detachments are required.

(j) Daylight and Darkness. Short days and long nights decrease the amount of daylight available for working and fighting in winter. Nights are often made bright by the moon, northern lights and stars. The possibilities of surprise are thus increased. In summer, the short nights may permit military activity throughout whole twenty-four hour periods. At times an overcast sky and snowcovered terrain create a certain condition of visibility ("Arctic Whiteout") which makes recognition of irregularities in terrain very difficult. "Ground drift" is a condition wherein wind lifts and drifts loose snow to a height of some ten to fifteen feet, above which is normally bright sunshine, and underneath an object cannot be distinguished twenty feet away.

BRIEF HISTORY OF SOVIET MILITARY OPERATIONS IN THE ARCTIC AND SUBARCTIC

4. The only large-scale campaign conducted by the Soviet Army in the Arctic or sub-Arctic during the Second World War was that against Finland. Initially in this campaign, Soviet equipment was poorly adapted for such operations, but, after efforts to improve cold weather tactics and techniques, the efficiency of the equipment and the proficiency of troops (especially that of elite ski troops) gradually improved. In addition, ski brigades, attached to army commands, were employed on special missions, and ski battalions were formed within each rifle division. The battalions usually used snow shoes rather than skis and their training and efficiency were inferior to those of the brigades. It should be noted, however, that the relatively light snow and low temperatures would limit ski activity in the true Arctic, for it is impossible to ski on snow at temperatures below about - 40 degrees Fahrenheit. Motor-sled battalions, with exceptional speed over snow, were developed, but are not known to have been used in battle.

5. The Soviet campaign in Finland was not characterized by any special techniques or tactics that were not equally evident in the major campaigns during the severe winters on the whole front. As the war progressed, however, the Soviet armies became better trained in certain obvious facets of employment, such as, for example, snow camouflage, construction of snow positions, movement of heavy weapons on improvised runners, use of snow ploughs on supply routes, etc.

6. Soviet naval operations in the Arctic and sub-Arctic during the Second World War were mainly confined to submarine attacks off the Norwegian Arctic coast and the Barent and Kara Seas. Submarines in the area apparently operated independently and not in packs. Surface operations in northern waters consisted chiefly of escort duty for incoming convoys and MTB attacks against German convoys on the Norwegian coast. Surface and submarine minelaying were carried out efficiently. Since the war, Soviet operations on the Northern Sea Route have provided experience in the field.

7. In the Finnish and German wars, Soviet military aircraft flew regularly at temperatures of - 30 to - 40 degrees Fahrenheit. In fact, on account of Soviet deficiencies in instrument flying, heavy cloud hampered activity more than cold weather. Frozen lakes were used as landing fields without difficulty, and two-engined aircraft were normally based on such fields. Some four-engined aircraft (TB-7 and PE-8 - gross weight about 80,000 lbs.) were also operated from lakes during the severe winter of 1939-1940. At the beginning of the war many Soviet aircraft were equipped with fixed or retractable skis, although this idea was apparently later abandoned, and special tyres were used on conventional landing gear. Since the war, Soviet flying operations along the Northern Sea Route and in Siberia have furnished further experience in Arctic and sub-Arctic flying.

PRESENT SOVIET TRAINING FOR ARCTIC AND SUB-ARCTIC OPERATIONS

8. There is no evidence of any special Soviet effort to train the Soviet army in Arctic and sub-Arctic operations, except for unconfirmed reports of exercises under exceptionally severe conditions apparently for the purpose of experimenting with new techniques and equipment. Normally, no special techniques or equipment are employed for cold weather training, and there is evidence that normal training is cancelled when the weather is especially bad.

9. It is probable that ski training takes place in ordinary units or in special units or in both. A Soviet Army Sledge Dog Training School, where special sleds and harnesses are developed, has been indentified.

10. It is doubtful if the Soviet Navy carries out any systematic plan for the rotation of personnel between duty in the Arctic and sub-Arctic and duty elsewhere, although some rotation probably takes place in the normal course of duty.

11. Again, there is no evidence of rotation of air force personnel to Arctic areas for special training, although the general Soviet practice of rotating air units could be expected to lead to some units being based in the north. There has, however, been a report of Polish youths being trained for the "Arctic Air Force."

12. Although normal rotation would be expected to provide training for some units, the military air strength north of 60 degrees North latitude is only a small portion of the total air forces of the Soviet Union. There is evidence of concentrations of aircraft in the White Sea and Archangel military districts and of at least one Soviet fighter regiment stationed in north-east Siberia. Apart from units deployed in Arctic regions the climatic condition of a large part of the remainder of the Soviet Union is so rigorous that normal winter operations would to some extent constitute Arctic training.

Ground Force Operations

13. Attack. Before the approach march civilian labour (where available) may be used to assist the Army in laying roads and tracks for different types of transportation. "Column roads" are built for wheeled and tracked vehicles; existing roads are improved, but can only be used by sleds; and "winter roads" are laid alongside them. "Corduroy roads" of logs and mats are made to allow artillery to deploy. All roads are carefully flagged or marked with painted luminous stakes. Ice-bridges are made from brushwood which, with water poured over it, remains solid well into the thaw period. Frozen lakes and rivers may be used as airfields.

14. The standard light sled used during the war by the Red Army was the volokusha. Drawn by two skiers, it can carry one light or heavy machine gun, a mortar, ammunition, supplies, or one casualty. It can also be employed as a firing platform for the heavy machine gun. Motor sleds, driven by propellers, were extremely effective both as combat vehicles and for transportation. The larger model can carry the driver and either four men with full equipment or 880 pounds of supplies. Sled trains, comprising a tractor and up to six sleds, are employed for transporting supplies. Infantry sometimes operates in armoured sleds, drawn by tanks or motor vehicles. Artillery may be mounted on sleds, runners or skis. Much use is made of pack artillery, and horse transportation is often used instead of motor vehicles.

15. Tanks with specially adapted wide tracks operate successfully in snow up to 20 inches in depth. When the snow is between 20 and 30 inches deep, their use is restricted. They move most easily over freshly fallen snow; a thick crust or wet snow tendsto clog and even break the tracks. They are provided with special equipment, including mats and grousers, for crossing snowdrifts and ice-covered slopes.

16. Movement in winter is generally slower, as columns are mainly road-bound, except for troops equipped with skis or snowshoes. If the snow is more than 12 inches deep the rate of march is reduced still further. Owing to the difficulty of rapid dispersal in the event of air attack, spacing between columns and echelons is increased by day. Motorized artillery and tanks generally move in independent columns on the best roads; but in very deep snow, in broken country and when enemy opposition is expected, tanks are distributed among the other columns in small groups in order to support the infantry deployment. As tank tracks are clearly visible from the air, armour seldom adopts any but column formation and, if possible, moves during snowstorms. The last tank tows a special roller, a coil of barbed wire or a tree trunk in order to obliterate the tracks. Ski units move in a number of parallel groups, in file or column of fours. Traffic control posts are equipped with supplies of sand and with snow-plows. Ration and warming posts are established on all supply routes. For the prevention of frostbite feet are bound with paper, infantry move alternatively with and without skis, and troops watch each other for symptons. During rests special details keep awake for the sole purpose of turning sleeping men over every 15 or 20 minutes to prevent freezing. If the state of the roads is bad, halts are made more frequently but are shorter. There are no long halts. Bivouacs are made in built-up areas, woods, or hollows with protection from the wind. Soviet troops show great skill in setting up snow huts (igloos) and wind shelters and in digging burrows in the snow. A common shelter known as the shalaski can be constructed very rapidly from branches and twigs covered with snow.

 SECRET

17. The following data are taken from Soviet manuals:

Rates of March:

	Kilometers per hour	Miles per hour
Infantry	3-4	1 7/8 - 2 1/2
Infantry (Snow over 12 inches deep)	2-3	1 1/4 - 1 7/8
Single skier	6-8	3 3/4 - 5
Small ski unit	4-6	2 1/2 - 3 3/4
Large ski unit	3-4	1 7/8 - 2 1/2
Motor sled	20-25	12 1/2 - 15 5/8

The rate of march of vehicles and cavalry is approximately equivalent to that of ski troops.

Days' March (6-7 hours):

	Kilometers	Miles
Infantry	18-24	11-15
Ski unit	30-40	19-25
Motor sled	100-110	63-69

Thickness of Ice

Infantry can cross ice 4 inches thick.
Medium tanks can cross ice 28 inches thick.
Heavy tanks can cross ice 32-40 inches thick.

Thickness of Snow-Tanks

Snow under 20 inches; tanks employed as usual.
Snow 20-30 inches; tanks move only short distances.
Snow over 30 inches; tanks not used.

18. Protection on the march is provided by groups of ski troops with submachine guns, towed heavy machine guns, motars, and anti-tank weapons. Troops travelling in motor sleds or tank-drawn sleds can also be employed. All protective detachments are accompanied by strong groups of engineers to reconnoitre the ground and organize the clearing and repair of roads for the main body. When an engagement is expected, reconnaissance patrols are put under the personal command of senior officers, who later take charge of the deployment. If tanks are available, a strong tank group moves in rear of the advance guard. Where stretches of ice have to be crossed, strong anti-aircraft and fighter protection is provided and emergency crossing equipment is carried, as there is a danger of the ice being broken by enemy artillery or bomber attacks.

19. Reconnaissance. This is carried out by troops on skis or, occasionally, snowshoes. Infantry, in sleds drawn by tanks or motor vehicles, can be used for long-range or shock tasks, and motor sled units for raids and patrolling, especially across ice. Dogs are often employed by patrols. Groups of picked men with skis or snowshoes are employed for long-range patrols behind the enemy lines.

Members of patrols carefully follow each other's trails, even placing their sticks in the same holes. When returning, however, they use a different route, their old tracks often being mined either by themselves or the enemy. Even in intense cold these troops seldom spend the night in inhabited areas but choose thickets, woods, or gullies and build improvised shelters. Partisans or paratroops were sometimes used in the Second World War to assist patrols in executing their tasks.

20. Preparation. The assembly area should be close to the jump-off position so that troops are not unduly fatigued before battle by a lengthy and arduous approach. Snow huts and dugouts should be constructed in the assembly area for warmth and protection. In deep snow the jump-off trench is dug very close to the enemy's forward defenses and sometimes even outflanks them. The trenches must be occupied for only a very short time before attack, or the men may freeze to death. For armour, a jump-off position with shallow snow is chosen if possible. Tank approach routes are very carefully reconnoitred and marked. Everything is painted white and personnel are given white camouflage clothing. Collecting posts are set up close to each other, if possible in huts or villages. Sledges and stretchers on skis are used for the evacuation of wounded, and stretcher-bearers and first-aid parties have skis. Every effort is made to keep the wounded warm with fur rugs. During artillery and air preparation the main object is to prevent the enemy from getting rest and warmth. In order to keep up constant bombing attacks, landing fields are prepared close to the front.

21. The Assault. Soviet troops take advantage of unfavourable weather conditions in launching tactical assaults with small units. Plans are flexible so that they can be adapted to sudden changes in the weather. The attack is initiated by shock groups of submachine gunners, who usually operate on skis. The first infantry wave attacks without skis if the jump-off position is close to the enemy's lines, if the snow is less than 12 inches deep or has a hard crust, or if there are obstacles which would make skis an encumbrance. When skis are not worn, squads are detailed to bring them up in the rear of the leading troops. The second and third waves and the reserves nearly always consist of troops on skis, and groups of skiers with support weapons are formed for attacking strong points. The interval between waves is reduced, especially if the snow is more than 12 inches deep. Close support is provided by the artillery mounted on skis, runners, or sleds, with accompanying detachments of infantry to help them forward. Self-propelled guns and tanks are used in preference to ordinary artillery. Infantry-support weapons are often sub-allotted to platoons. Armour is not split into small groups but operates in mass. Tanks advance on a broad front, usually in two waves, and as far as possible in a straight line. They generally choose ground where snow is shallow. Tank and mechanized units are given especially strong support by artillery, anti-tank weapons, and infantry-support weapons, and are always accompanied by ski units. The favorite manoeuvre is an outflanking movement by the main forces with a holding action from the front. If an attack is unsuccessful the troops often remain in slit trenches in the snow until nightfall, when they re-group and launch another effort. The protection of re-grouping is one of the special tasks of ski troops.

22. Exploitation and Pursuit. The last phase of the attack is usually a wide outflanking and enveloping movement largely executed by ski troops and motor sleds. Cavalry, tanks, and motorized infantry are employed only if the snow is less than 20 inches deep and if there is an adequate road network. Bold thrusts to the rear by even small ski groups may have decisive results. The skiers receive the closest possible support form armour and artillery. The special task of the artillery is to keep the enemy away from the roads and areas of shallow snow, and efforts are

made to attack columns at points where they cannot deploy because of the state of the ground. Aircraft are used not only for attacks on rear areas and reserves but also for supporting ski spearheads making deep penetrations beyond the range of their own artillery and in country unsuitable for tanks.

23. Defence. Strongpoints and "defense focal points" are located, if possible, in wooded countryside with numerous built-up areas for billeting purposes. The main defence line is normally on, or in rear of, natural obstacles; all cover forward of the line is destroyed if possible, so that the enemy's forces, obliged to remain in the open, become weakened by their privations. In the same way it is considered good policy to locate the main defence line, or vital parts of it, on high ground, as enemy troops attacking uphill become exhausted more rapidly.

24. Since troops cannot operate away from shelter for long periods, the maintenance of continuous fire cover for the whole of the ground forward of the main defenses is often impossible; active patrolling is, therefore, maintained throughout the 24 hours by ski patrols. Obstacles and mines are laid in front of the forward position and are supplemented by defensive fire from artillery and mortars.

25. Reserves are kept under cover in billets or dugouts and are given training on skis to increase their mobility. Ski-runs are often constructed for them in the most likely directions in which they may be employed; these ski-runs are provided with obstacles that can be hastily erected to block them in an emergency.

26. Engineers play a vital role in winter defence; in the preparation of billets, dugouts, and winter camouflage, and in road maintenance along the lines of communication and in forward areas. Artillery (including mortars) has the special task of denying to the enemy the use of roads and villages, forcing him to spend as much time as possible deployed in open country. Routes for tanks are carefully reconnoitered, prepared, and maintained. Measures for warming up tank engines and arrangements for quick starting are constantly under review. Little is known of Soviet adaptations of normal maintenance techniques to Arctic and sub-Arctic weather, beyond the employment of shelters for warming equipment and protecting technicians.

Naval Operations

27. Maintenance of Equipment. The Soviet Union has demonstrated a capability to maintain equipment for air and sea operations in extremely low temperatures. However, daily maintenance will require some kind of shelter, and periodic inspections and major repairs will involve moving vessels and aircraft, if possible, to suitable bases.

28. Mobility. Naval mobility in the Arctic is limited by ice conditions. The Soviet Union, perhaps more than any other nation in the world, has been keenly interested in the study of naval operations in Arctic ice. From their research and experiment in this field, the Soviet Union has acquired knowledge and experience of the Arctic, which it has put into practice. The most notable of its accomplishments is the Northern Sea Route, the development of which emphasized the Soviet capability of moving naval forces through Arctic regions. The capability is, of course limited by the availability of icebreakers and the length of the navigational season.

29. Navigation. Navigation in Arctic waters differs substantially from that of other oceans. In this region, tips of the warm equatorial currents meet cold water flowing from the Polar ice cap and cause peculiar stratification of the water. The cooling of the air over the ice results in fogs, mirages and distorted pictures. During certain periods of the year, celestial navigation is extremely difficult because of cloud cover and lack of visibility of the horizon. Within about one thousand miles of the North Magnetic Pole, the magnetic compass is of little use for accurate navigation. In high latitudes, the gyro compass (as opposed to the "directional gyro") is unreliable.

30. Radio communications suffer occasional interruption in the Arctic regions of North America and interruption to a slightly lesser extent in Siberia and Arctic Russia. Moreover, particular caution must be exercised in navigating along the ice edge and rocky coasts which have been scantily surveyed. Varying currents and inaccurate depth data on charts pose additional problems to dead reckoning navigation. However, the Soviet Union has probably equipped its units with better and more accurate hydrographic materials than those which are available to foreign mariners.

31. Radar has tremendously increased the capabilities of navigating and piloting under bad weather conditions. On the fringes of the pack and in areas where icebergs may be encountered, surface search radar will detect icebergs at distances sufficient to avoid collision.

32. The navigation of submarines under ice is an especially difficult problem, but we have no knowledge of the Soviet position in this field.

Air Operations

33. Apart from the staging of aircraft into outlying Arctic areas for offensive strikes in the event of war, it is probable that the basic Arctic air mission will remain predominatly defensive until communications facilities are improved enough to provide the logistic support necessary for sustained offensive air warfare.

34. Maintenance. The Soviet Union has demonstrated its capability to maintain equipment for air operations in extremely low temperatures. Daily maintenance will require some kind of shelter, and periodic inspections and major repairs will involve flying the aircraft, if possible, to suitable bases.

35. Airborne Operations. The great distances and extreme lack of land transportation, and the difficulty of conducting ground operations, emphasize the importance of airborne operations in Arctic areas.

36. Little is known about present Soviet training for military airborne operations in the Arctic, but there are now estimated to be some 100,000 qualified paratroopers on active duty in the Soviet Union; air-transportable troops probably number another 100,000.

37. Navigation. Aerial navigation in the Arctic and sub-Arctic is difficult. The Soviet Union has carried out much research on navigational aids and the necessary theoretical knowledge for successful polar navigation exists. Navigation in the Arctic with the equipment now available is within Soviet capability.

38. Supply. All supplies and munitions for Arctic air operations must be procured from the industrial areas of the countries involved. In Western Russia, this area lies between 50° and 60° north latitude-- approximately 1,000 nautical miles nearer the North Pole than a comparable area in North America. Nevertheless, the length of the Soviet lines of communication, plus the manifold difficulties presented to their supply organizations by the conditions prevalent in Arctic regions, would entail the construction of large storage facilities close to the theatre of operations. This would be an added burden because of the construction requirements for this storage.

39. In general, the problems of supplying air operations in Arctic and sub-Arctic areas are less serious than those for ground operations. Permanent and semi-permanent air bases will tend to be located where logistical support is readily available. Consequently, there will be more facilities of all kinds at these bases.

40. In summer, logistic support of air bases along the Arctic coast and the Siberian rivers may be simplified by using water transportation. However, the logistical problems of outlying units will be magnified. The frozen soil and permafrost prevent the melting snow and ice from draining, and this causes extensive floods. The soft ground, swamp-like after spring thaws, forces sleds to be used in some areas in summer as well as in winter. Summer is also the worst season for flying in the Arctic, especialy for reconnaissance and ground-supply. Nevertheless, logistics for air operations will be less adversely affected in summer than will those for ground operations. Another main effect of the summer season -- insects -- will be felt in reduction of efficiency of personnel.

41. Ground operations in Arctic and sub-Arctic terrain will indirectly affect air operations in that more supply and evacuation by air will be required by ground troops. In winter, cargo planes can be landed almost anywhere and unloaded; but in summer, most of the supplies will have to be air-dropped. Similarly, evacuation will be fairly simple in winter but difficult in summer. To overcome the difficulties imposed by the terrain and the lack of landing facilities in summer, the extensive use of helicopters for liaison, reconnaissance, observation, and supply and evacuation would appear to be one solution. It is not known what specific progress the Soviet Union has made in the development and production of helicopters, although it is known that some have been produced and nine helicopters of a new model were demonstrated in the July 1951 Air Show in Moscow.

Meteorology

42. The conditions which prevail in the Arctic make adequate weather and ice forecasts essential for successful operation of air and naval forces in the area. An extensive system of attended and unattended weather stations has been established by the Soviet Union in the Arctic and along the Northern Sea Route for this purpose. The use of aircraft in daily weather reconnaissance flights, the location of automatic weather stations in remote northern areas and the establishment of surface stations on ice islands, can contribute appreciably to more accurate weather forecasting. The employment of submarines within the polar ice pack is a possible future aid to such forecasting. All of these means for gathering weather information are believed to be well within the capability of the Soviet Union. Knowledge of Arctic forecasting procedures and problems is believed to be very advanced.

43. Ice Forecasting The Soviet Union has paid considerable attention to ice forecasting and an elaborate organization, centred at Leningrad, has been created for this purpose. By 1940, forecasts for 5 or 10 day periods were being made for the Kara and Lapter Seas from Dikson and for the eastern seas from an ice breaker. 75% correctness was claimed for long-term forcasts in 1940, and from 65-85% correctness for short-term forecasts in 1939.

Intelligence Operations

44. The Soviet Union's capabilities for intelligence operations in the Arctic and sub-Arctic are difficult to assess. These areas impose unusual problems: the settlements are few and far between, and the population density is insufficient for obtaining covert intelligence; the territory is vast and there are few accurately charted, indentifiable landmarks. The wind-blown snow, a highly effective natural camouflage for immobile objects, sifts into crevices, distorts appearances and merges landscapes until familiar things and terrain are unrecognizable from the air; photo reconnaissance is relatively ineffective during part of the year because of clouds and fog, and because shadows of the snow cover have little relation to the true shapes of blanketed objects. The seasonal variations of daylight and darkness, and also the conditions of climate and weather, restrict intelligence operations, and detailed maps of many areas are almost completely lacking.

45. Soviet doctrine stresses various means for effecting reconnaissance and intelligence collection. Parachute patrols of two or three persons equipped with a radio were frequently dropped on the Finnish front to observe and report road movements. Ski troops were widely used for rear area and flank reconnaissance. The use of assault reconnaissance to seize and interrogate prisoners was a common practice on the northern front in World War II. Although aerial reconnaissance is exceptionally important in operations over snow, the Soviet Union had little success in this field against the Finns, possibly due to poor photography and interpretation techniques.

CLOTHING, SHELTER AND PERSONNEL PROBLEMS

Clothing

46. The Soviet Union issues various kinds of special clothing for cold weather fighting, the amount and type depending on the severity of the weather. For the onset of cold weather, the woollen tunic and breeches, worn beneath the military overcoat, and woollen-cotton underclothing are considered sufficient. Adjustments to changing outside temperatures are made by the "layering" principle -- garments being added or taken off as the situation requires.

47. Various items of standard Soviet issue are suitable for use in cold weather operations. They are as follows:

(a) Standard winter cap (wool) - ushanka.

(b) Knitted toque, with extra flap sewn horizontally around it from ear to ear.

(c) Mittens, three compartment type, fur or moleskin lined.

(d) Two-piece cotton padded, quilted suit consisting of jacket (single-breasted, fastening down the centre by means of tabs and buttons), and breeches of the same material, fitting tightly around the bottoms of legs. The suit fits loosely and can be worn over either regular winter uniform or the long winter underwear. It is light in weight, suitable for combat, and fairly comfortable at low temperatures.

(e) Sheepskin coat, the shuba, consisting of a leather coat with fur lining, single-breasted, with a wide overlapping at the closing which is fastened by concealed hooks.

(f) All-felt, knee-length boots, the valenki, for wear in dry-cold climates, made of thick rolled felt about one-fourth inch thick in the leg portion but thicker in the foot and sole. They are worn with as many woollen foot-wraps as needed but must remain loose-fitting as a precaution against freezing. For wet cold, a modified form of valenki is worn, having the shoe portion covered with rubber.

48. For extreme cold, maximum protection is provided by the "arctic" uniform which consists of the following:

(a) Heavy cotton quilted jacket lined with reindeer, fox, or dog fur, with a fur-lined collar.

(b) Heavy cotton quilted trousers with lining extending four inches below the trouser legs forming a tight cuff, and reaching well above the waist.

(c) Knitted wool turtleneck sweater worn underneath the jacket and trousers.

(d) Arctic overcoat, a one-piece reindeer-skin garment extending down to the ankle. Its sleeves are slitted so that they can be rolled back to expose the hands.

(e) Fur-lined mittens.

(f) Polar fox skin cap with 1½-foot flaps on each side for wrapping as a muffler.

(g) Quilted wool cap lined with imitation fur.

(h) Arctic boots, reaching to the thigh, with felt soles and heels. The shoe portion is made of leather, and the uppers are made of dog or other skins sewn together with the hair portion of one turned toward the leg and that of the other turned out. The boot has a leather strap with buckles over the instep, a leather strap just below the knee, and leather loops at the top for fastening to the belt.

(i) Socks made of sheep or dog skins, worn inside the boots.

49. The "mountain" uniform, which also may be worn in cold weather operations, is a special storm suit made of waterproof and windproof material. It consists of the following: double-breasted, hip-length, loose-fitting jacket; full-out woollen trousers, with two hip pockets. The storm suit is worn over the padded or quilted suit when protection is required for windstorms, snowstorms or low temperatures.

50. Four types of camouflage uniforms are used, as follows:

(a) White, two-piece suit consisting of trousers and jacket with hood.

(b) Mottled green coverall.

(c) Two-piece mottled suit with a hooded cape.

(d) Reversible mottled green-white suit of rubberized fabric.

51. An evaluation of the protective qualities of these special uniforms may be inferred from the fact that cases of frostbite, of which the Soviet Army has very few, are blamed on poor management and carlessness.

52. Reports have been received that the following items of clothing are generally issued to Russian crews on ships of the Northern Sea Route: goatskin, knee-length coat, fur inside, with high collar; goatskin helmet leaving only the eyes exposed; knitted cap worn inside helmet; felt knee-high boots; high, heavy woollen stockings; large, soft-soled, sheepskin slippers for wear inside boots; heavy, canvas coated pants tied at ankles; canvas padded jackets tied at wrist and neck; goatskin mittens, fur inside; knitted gloves for wear inside mittens; heavy knitted long underwear; extra sheepskin bed blanket for each man; flannel shirts and one sleeveless leather jacket, sheepskin lined.

53. It is highly unlikely that all of these items are in the possession of each man of the Northern Fleet, since most personnel of the latter are stationed west of Novaya Zemlaya, on the Barents and White Seas, where weather is less severe.

Shelter

54. The ability of Soviet troops to make comfortable shelters with little or no special equipment was an important factor in the conduct of winter operations in the Second World War. For warmth and shelter they used tents, shields, huts, and dugouts. If lumber was not available, dens and various types of huts were built in the snow, using snow, ice, and/or frozen ground. Regulation Soviet equipment and techniques for cold weather shelters are as follows.

55. The standard Soviet winter field tent consists of two one-piece canvas tents, one inside the other. It is supported by one centre post and is fastened to the ground by tent ropes tied to metal pegs frozen into the ground. It is heated by a portable stove.

56. Soviet troops rely heavily on improvising shelter out of whatever is available. Huts of various sizes are made of wooden frames covered with branches, snow and sometimes shelter halves or tents. The following types of shelter are also known to be used:

(a) Shields of slanted "walls" made from wooden poles or trees covered with snow, branches, or tent canvas. They are of single or double type, and are heated by placing two burning logs, one above the other, on the lee side of the single type, or in the centre of the double type. These fires are reported to provide a small glow with sufficient heat for 24 hours.

(b) Round huts, constructed from wooden poles and covered by shelter halves, branches, etc. A fire is built within; smoke escapes through a hole in the upper part of the structure.

(c) Dugouts of various sizes covered with logs or unfinished lumber. Fireplaces are improvised at the ends of tunneling to the surface of the ground, to form a chimney.

(d) Snow huts of the igloo type, built from blocks of firm snow. They are heated with fuels such as kerosene or charcoal which do not require a flue.

(e) Snow dens built from lumps of firm snow, or dug in snow drifts and covered with wooden rods or skis, matting, and a layer of snow. The walls and floors are also covered with a layer of brush, matting, or straw. Reportedly, the temperature inside may be maintained at 2 to 3 degrees above freezing by the warmth of the occupants alone.

57. The Soviet Army has attempted to devise adequate drying shelters for clothing, footgear, etc., by using dugouts with two fireplaces and campfires with steeply sloped shields. The effectiveness of these improvised sheds is not known.

Personnel

58. Winter in the Soviet Union generally duplicates the conditions of military operations in cold weather. As far south as the southern Ukraine, intense cold and deep snow greatly restrict normal working and living habits. Before and after the winter season, deep impenetrable mud prolongs the period of enforced inactivity. Most of the Soviet population live in small communities far from cities, and there is a lack of good roads connecting these communities with the cities or even with one another. As a result, isolation, accompanied by inactivity and little or no recreation or entertainment, becomes the rule rather than the exception for life in the Soviet Union. The Soviet soldier, as an individual, thus acquires an exceptional ability to adjust to the circumscription of personal life in warfare generally, and cold weather warfare in particular.

Physical Limitations.

59. From a military point of view, the physical limitations imposed by Arctic and sub-Arctic weather are reflected in increased ration requirements, decreased ability to march and carry loads, and susceptibility to frostbite.

60. A Soviet writer (M. Belyakov) has recommended a daily ration of 5,500 calories for hard expeditionary work, and the quantity of food to be distributed as 160 grams of proteins, 240 grains of fats, and 900 grams of carbohydrates. It is likely that this daily ration, or something approaching it, has been made standard for military groups operating in similar conditions.

61. Soviet doctrine requires special attention to physical conditioning of troops for cold weather. This can only partly compensate for the rapid exhaustion caused by winter conditions, however. Precautions against frostbite are stressed by the Soviet Union and are well known to most troops. Special care of clothing, observation of fellows, and other measures are maintained by strict discipline. Occurrence of frostbite is severely punishable.

SOVIET EQUIPMENT IN THE ARCTIC AND SUB-ARCTIC — SECRET

Army Equipment

62. Small Arms and Artillery. Most standard Soviet small arms and artillery weapons appear to be usable or adaptable for cold weather operations. The simplicity of Soviet small arms, particularly the sub-machine gun, contributed to their performance in cold weather during the Second World War. Soviet troops are well practised in the use of Arctic lubricants for artillery, as well as in the use of special recoil fluid. Weight of fire with lightness (which aids mobility over snow) is achieved to some extent by the use of large calibre mortars in forward artillery roles.

63. Vehicles. Soviet troops maintained a high degree of readiness of armoured vehicles in winter by applying simple methods, including digging tanks into the ground, using special tank heaters and lubricants, and diluting lubricants with gasoline. The simplicity of the Soviet armoured vehicle (which uses one type of engine for the G-34 and JS-3 tanks, and medium and heavy self-propelled guns) is useful. Torsion-bar suspensions and enclosed spring systemshave been found most suitable for winter operations and the Soviet electric and pneumatic dual starting system is useful in cold climates where the efficiency of storage batteries deteriorates with drops in temperature. Soviet trucks are mainly copies of the United States Second World War vehicles and possess no special advantages for winter mobility. A variety of sleds, ranging from individual hand models to propellor-driven motor sleds, has been used, although the propeller-driven model was a conspicuous failure, at least before the second world war. A tractor (the KT-12), which burns wood chips, is in production, and a half-track lorry which has been widely used on the Arctic coast was produced in the 1930's.

64. Railway Equipment. Standard Soviet railway equipment is generally adaptable for cold-weather operations. There is no indication that diesel equipment is operated in Arctic areas, although electric power is used on the Kirov railway across the Kol'skiy Poluostrov.

65. Ordnance Stores. Standard stores are adaptable for Arctic and sub-Arctic use and special-issue clothing is available. Certain development projects are known to have been carried on with improved ski waxes, rubber de-icers for the soles of foot-wear, double-wall canvas tents with heated floors, special cotton-padded textiles and the use of skins of sea animals in place of leather.

66. Mines. The simplicity of the Russian mine lends itself to use under winter conditions. Moving parts, which areat a minimum, have easy clearances so that they will not seize up. Mines using pressure igniters are preferred to the pull-or pin-withdrawal type of igniter. Plastic explosivesare unsuitable and do not retain their plasticity in low temperatures. Other types of explosive become more sensitive, but their strength is reduced. Safety and detonating fuzesbecome very brittle.

67. Mine Laying. In soft snow, mines are laid on a base of wood or stones so that they are crushed and not readily pressed into the snow when a load comes on them. In hard snow, there is a danger that the pressure of the enemy vehicle may be carried by a bridge of frozen snow which has formed over the mine. To obviate this, an extra pressure plate is placed just below the surface of the snow and resting on the pressure plate of the mine. During the thaw period, mines will sink into the mud unless placed on a stone base or planks. The minelaying technique varies with the depth of the snow as follows:-

(a) Snow 2" - 4" deep - Mines flush with ground
(b) Snow 4" -12" deep - On top of ground
(c) Snow 12"-24" deep - On top of a firm base not more than 12 inches deep.
(d) Snow over 24" deep - Minelaying is considered unnecessary as the snow is a sufficient enough obstacle.

If the snow has formed a frozen crust, mines should not be buried more than 4" to 6" inches deep.

68. Mine Lifting. The extraction of igniters and detonators from frozen mines is impossible and they should be destroyed in situ. The behaviour of mine detectors is only affected in so far as the cold reduces the capacity of the batteries. The theory that proven tracks are safe does not hold for frozen or thawing ground.

69. Chemical Warfare. No information is available about Soviet use of CW in the Arctic and their standard respirator is not well adapted for use in low temperatures. All CW agents, other than very volatile gases, behave differently at very low temperatures, and therefore present a new set of problems.

70. Medical. There is little evidence to support the view that significant progress has been made in the design of special medical equipment for Arctic use.

71. Signal. The simple, functional and rugged construction of most Soviet signal equipment will enable it to work effectively in the Arctic and sub-Arctic. Tests on recent models of Soviet radios have, in fact, revealed unusually good cold-weather performance.

Naval Equipment

72. Merchant Marine. In the merchant marine field, the Soviet belief is that small vessels generally are best suited and used in the Arctic region. This limitation is dictated by the shallow waters of the Arctic Sea coast and by ice which tends to trap and crush deep draft ships under certain wind and other weather conditions. One voyage per season per ship any considerable distance into the area is believed to be the turnaround time for Arctic marine operations.

73. It is difficult to determine how much cargo can be transported over the Northern Sea Route. Despite some seasonal fluctuations it is believed that about 300,000 gross tons of shipping operate on the route. Possibly two-thirds of this amount operates in Western Arctic waters, mostly to and from Murmansk and Archangel. The remaining third enters and leaves the Arctic area through the Bering Straits in the east. Turnover on the route is believed to be higher than in the pre-war years.

74. Icebreakers. As early as 1946 the Soviet Union is known to have been experimenting with icebreaking by the use of water jets to cut ice in advance of a ship. The Soviet Union is thought to have about 120 icebreakers.

75. Guided Missiles. A few unconfirmed reports state that the Soviet Union has tested the launching of V-1 type missiles from submarines of a fleet manoeuvering in arctic water and based at Archangel. Although the reports are unconfirmed, it is likely that the Soviet Union has given serious thought to the cold weather operation of V-1 (and possibly other) missiles.

76. Underwater Weapons. There is no information on the extent of cold weather tests conducted by the Soviet Union on underwater weapons.

(a) Mines. Moored contact mines were laid in the Murmansk-Archangel region during World War II. It is not believed that moored contact or accoustic mines would be used in locations where ice conditions exist. Therefore, the type most likely to be encountered would be the magnetic mine. However, there is no information available on which to assess the Soviet capabilities in this field.

(b) Torpedoes. The Soviet Union has undoubtedly test-fired torpedoes in Arctic areas from both above-water and submerged tubes. It is assumed that they are capable of operating above-water tubes in the temperatures encountered; submerged firing should pose no serious problem. The torpedoes themselves might be sluggish in their operation and improvements in known operational torpedoes can be expected.

(c) ASW Weapons. The only known Soviet antisubmarine weapons are conventional type ahead-thrown weapons and conventional depth charges.

77. Surface Weapons. The Soviet Navy operates in Arctic waters as normal routine and can be expected to have acquired extensive knowledge of the ordnance problems created by extremely cold weather conditions. It is assumed that cold weather equipment has been incorporated in most Soviet Fleet units, as interchangeability of vessels between fleets is necessary.

78. The over-all capabilities of Soviet naval surface weapons for Arctic warfare are better than those of current Canadian weapons, as the Soviet Union has operated extensively in Arctic areas. Soviet personnel are thoroughly indoctrinated in Arctic operations techniques. It is believed that Soviet weapons are better protected and easier to maintain in operating condition in the Arctic than those of any other seapower.

79. Naval Communications Equipment. Soviet naval communications equipment is very simple, but normal performance is comparable with that of Canadian equipment. The equipment so far known is less rugged than ours and is far more sensitive to the effects of wide temperature variations, high humidity, shock, vibration, and salt spray than comparable U.S. equipments.

80. The local oscillator in the Soviet Navy's PURGA-45 receiver provides temperature stability of 0.035 per cent/degree Centigrade as compared to the U.S. Navy RBB/RBC stabilities of 0.001 to 0.003 per cent/degree Centigrade. To provide calibration needed due to excessive temperature changes, the Soviet set is provided with a simple built-in frequency meter.

81. There is some indication of improved component design. The best example is the KV-M receiver, a copy of the Hammerlund Super-Pro. Although no particular or original cold weather protection is apparent, general improvement of component design over earlier sets is evident.

82. For many years the Soviet Union has made wide use of low frequencies. This type of communication is more reliable in the Arctic, where high frequencies are subject to occasional failure.

83. Electronics. There is no recent information indicating the Soviet electronic approach to the Arctic navigation problem. Continued interest in medium frequency direction finding is evidenced by their standard use of such gear on all their fleet units. Intelligence reports have indicated Soviet interest in a navigation aid similar to low-frequency LORAN.

84. It is considered very likely that the Soviet Union is in a position to utilize our own navigation aids. Outside of that and the possible long-range hyperbolic aid discussed above, reliance upon celestial aid and direction-finding is most probable. There is no evidence of naval electronics work, other than that mentioned above, with cold weather implications. It is believed that the developments most worthy of watching for cold weather implications are the very-low frequencies, possibly for communications and/or navigation.

85. General Design Characteristics. There is no detectable difference in design or equipment between naval vessels stationed in the Arctic and their sister ships serving in other ocean frontier zones of the Soviet Union.

86. Research and planning to improve ice navigation and to increase seaborne trade in the Arctic apparently are still in progress. Some merchant vessels acquired recently have been provided with additional strengthening - in particular a large number of fishing trawlers, which are potential escorts, minesweepers and coastal cargo vessels. Larger and more powerful icebreakers are on order and perhaps one super-icebreaker is actually under construction in the Soviet Union. In additional, many scientific expeditions have been sent into the Arctic: 400 investigations were reported to have been conducted between 1947 and 1951.

87. Naval Munitions. Soviet powder train time fuzes, such as have been encountered in Korea may be better adapted for cold weather operations than mechanical time fuzes. Likewise, VT fuzes are subject to premature bursts in the Arctic and sub-Arctic. Gun propellants are largely unaffected by cold although initial velocities and resultant ranges are decreased by cold weather. Primers and detonators have functioned normally in past Arctic tests.

Air Force Equipment

88. In general, Soviet air force equipment is rough and crude compared to that of Western manufacture. On the whole, this cruder and more rugged equipment is more workable under Arctic conditions than are its Western counterparts.

89. Aircraft Equipment and Weapons. The turbojet fighter or interceptor appears to be the type of aircraft most readily adaptable to Arctic operation. This type of engine is simple and can be easily started when cold: consistently good starts have been obtained at temperatures as low as -56° F. It can be maintained in a permanent state of readiness with considerably less ground equipment than is necessary for conventional engines. Since the Soviet Union has placed emphasis on jet aircraft development and production, it is logical that it would employ aircraft of this type in future Arctic and sub-Arctic operations.

90. Among special problems on which no information is immediately available with regard to Soviet solutions are: the freezing of cockpit instruments; the stiffness of operation of the moving parts of automatic weapons and other material due to cold lubricants; the improper functioning of equipment and the leakage of fluids due to differences in the contraction of materials; the failure of bomb fuzes, instruments, weapons, and equipment due to the freezing of condensation, and the distortion of moving parts having close tolerances.

91. Communications. The difficulty of constructing and maintaining land lines for communications has forced the Soviet Union to rely upon radio to a large extent. In 1946, approximately 270 radio stations of various types were listed as located north of 60 degrees north latitude in Russia. This does not include amateur stations that have been reported as far north as Wrangel Island and Novaya Zemlya. Reports indicate that the Soviet Union has instituted a chain of unattended stations that will transmit weather information. During the summer of 1945, United States aircraft ferrying aircraft to Siberia from Alaska noted that homing beacons every 600 miles constituted the main form of navigational aid in that area.

92. Radar. The Soviet Union received a large quantity of radar equipment from the United States and the United Kingdom during World War II. In addition, a great deal of German equipment was captured or otherwise acquired. Since then, the Soviet Union has benefitted from published US work and from German scientists and technicians and has succeeded in modernizing equipment. It is known to have radar installations in the Murmansk, Chukotski, and Kamchatka areas. The Soviet Union has the capability of installing networks of radar early-warning stations in Arctic areas, but may have difficulty in obtaining the trained technicians required to operate these stations.

93. General Design Characteristics. Soviet concentration on simplicity in all items of materiel and equipment makes for standardization and facilitates production and maintenance by semiskilled labor, the training of personnel, and logistics. Although some of the materiel and equipment used in the Russo-Finnish War and in the Second World War is now obsolescent, information on Soviet research, development, and production for its replacement is far from complete.

94. However, as a result of intelligence acquired during the Korean campaign, it is now considered that Soviet technical advances have been more rapid in a number of fields than had previously been expected. Improved engine technology, as demonstrated by the modified Soviet version of the Nene jet engine, is one example. Advances have also been made in the electronics field.

95. Soviet radio-communications equipment adheres to accepted foreign design and construction practices. However, it does not follow that late designs of Soviet electronic equipment are inferior to United States types, for Soviet-made equipment captured in the Korean campaign conclusively demonstrates that the Soviet electronics industry made great strides in the period from 1949 to 1951. Formerly, Soviet receivers contained German, American, and Soviet parts; recent receivers have only Soviet components of good design. Available information on the Soviet electronics industry indicates that it is producing communications equipment that is well engineered, comparatively cheap, easy to maintain, and which meets Soviet operational needs.

TRANSPORTATION IN ARCTIC AND SUB-ARCTIC OPERATIONS

96. Since snow, mud, ice and cold militate against ease and swiftness of movement in the Arctic and sub-Arctic, an exceptional strain is placed upon the exceedingly limited roads and railways of the region.

97. Railways. Although difficulties are great, it is possible to construct railways in the Far North with special techniques. Maintenance is excessive, and constant surveillance must be maintained over every mile of track so that repairs can be made before rolling stock is damaged. Railways nevertheless are more suitable for year-round transportation than are highways or cross-country movement. During the fighting on the Kola Peninsula in the Second World War, the fact that the Soviet Union were able to hold the Murmansk railway and keep it open for traffic through most of the war was an important element in their success. Three railways serve the northern areas of European Russia. The Leningrad-Murmansk railway has a branch just south of Kandalasksha that connects with Kemi in Finland and with the Scandinavian Peninsula. A branch from Belomorsk, along the south side of the White Sea, connects with the Moscow-Arkhangelsk line. Both the Kemi and Belomorsk branches were constructed during the war. The latter railroad also has a branch from Konosha to Kotlas, connecting with the Kotlas-Vorkuta line (the Pechora railway) and a branch from Volgada, connecting Leningrad. The Kotlas-Vorkuta railway has been extended to the Ob River.

98. Roads. As in the case of railways, firm road beds are necessary, making the scarcity of rock and gravel in some areas an important problem. In sub-Arctic regions where timber is available, corduroy roads are built. During the Second World War, corduroy roads over mud and swamp were the most important static improvision of the Russian campaigns.

99. In winter, roads require special maintenance. Snow plows must be kept constantly at hand. Rest stations with warm quarters must be established at short distances along the roads for drivers and maintenance personnel in case a blizzard strikes or motorized equipment becomes stalled. In wartime these are invaluable for use by troop units on the march.

100. Winter roads, particularly if they are improvised for military purposes, may not have a definite course. Heavy snowfalls and drifts may make regular routes impassable, especially where defiles or roadcuts are filled with snow. In the barrens, the best routes are over windswept heights, avoiding sheltered localities to reduce the incidence of snowdrifts. South of the tree line, frozen water courses normally offer the best route. Markers are an adjunct to winter roads, and after a blizzard they may have to be moved to a new course if it is better cleared than the old route.

101. In summertime, roads are severly affected by the thawing of soil moisture and snow cover. The Germans found that even the few Soviet hard-surfaced roads in the North sometimes were impassable during a thaw. Use of roads in the mud period, even though passable to a limited extent, was found to be impractical except during night frosts and early in the season. Continued use turned muddy roads into impassable mires, and the ruts and ridges formed by passing vehicles became cement-hard obstacles after the road dried.

102. Marshal Timoshenko is reputed to have told Stalin at a military conference in 1941, "The muddy season, even more than the winter, will help to destroy the Germans." Judging from German war reports, this prophecy was well reasoned. All movement was paralyzed, at least during the worst part of the mud season, and special "mud period supply dumps" had to be established. Such supply as could be maintained at all under mud conditions relied on horse-drawn carts and other slow, tedious means.

103. During the Finnish campaigns, vast trackless wastes were ignored by both sides in summer and winter. There were five key roads in this region, and the broad spaces between them remained almost untouched by the war. Road networks in the Soviet Union are relatively primitive and undeveloped, expecially in the Soviet Arctic and sub-Arctic. Among the exceptions are the two all-weather highways in eastern Siberia, which run from Magadan inland to the upper Kolyma river and from Never on the Trans-Siberian railroad to Yakutsk. Many existing roads are ordinary dirt paths, entirely impassable by wheeled vehicles during long periods of the year because of rain or snow. Dust could also be troublesome. Long-distance movement of passengers and freight by highway is negligible anywhere in the Soviet Union and virtually nonexistent in the Soviet Arctic. Some use is made of caterpillar trains and air sledges in the Soviet Far North.

104. Merchant Shipping. Lateral transport of supplies to bases or operating units along the Siberian coast may be accomplished by the use of the "Northern Sea Route" which connects European Russia with eastern Siberia via the Arctic waters. This route, with western anchors at Archangel and Murmansk and eastern terminus at Vladivostok, is about 7,000 miles long. The operations of the Northern Sea Route Administration are creating a reserve of personnel indoctrinated in the problems of Arctic flying and movement by sea in Arctic waters.

105. As related to merchant shipping, the Arctic navigation season (for complete transits) usually extends from mid-July through September. The east (Bering Sea) and west (North Atlantic Ocean) approaches to the Arctic Sea are open longer. This means that vessels could stage in those approaches before the Arctic season and increase the total time available; for example, ships can start moving from the Baltic in April and May in time to reach the Arctic to coincide with the arrival of warm weather, thus extending the season a month or two. However, even in August, some ice is found in the form of bergs and floes (packs) which necessitate assistance from icebreakers, and fog is an important hazard. The same limitations apply in general to the transit of naval vessels via the Northern Sea Route. Observations of the state of the ice from aircraft before and during the navigational season is an essential condition of successful shipping operations. Bases for air reconnaissance have been established along the entire route and in addition large Soviet icebreakers carry one or two aircraft.

106. There is no known fixed operational pattern for merchant shipping in the Arctic. Vessels can proceed singly or in groups. They follow courses dictated by depth of water and ice conditions, usually following a route that may be considered as coastal. Local deviations are made, not only as imposed by these factors, but as recommended by aerial reconnaissance of ice-free areas ahead. Not many vessels make complete transits of the Arctic Sea route. The majority operate from either end (Murmansk-Archangel in the West and Vladivostok in the East) to some point along the coast and then return to the starting point. The main Arctic ports served are those at the mouths of the great Siberian rivers -- the Pechora, Ob, Yenisei, Khatange, Lena, Kolyma and Anadyr. Icebreakers are essential to the operations. However, rather than tie up icebreakers in continuous escorting, they are disposed along the route at bases provided with radio equipment, and they are dispatched as required to escort or extricate vessels caught in pack ice.

107. Beginning in 1931, ships have succeeded in completing the through passage from Archangel or Murmansk to the Bering Sea, or the reverse journey, during each season in periods varying from six to twelve weeks. The fastest trip was made in 1940 by the German auxiliary cruiser "Komet" (3,300 tons), with Soviet icebreaker assistance and under particularly favourable ice conditions. Passage was made from Novaya Zemlya to the Bering Strait in about 20 days.

Inland Waterways

108. Inland waterways provide the only surface means of transportation between the Arctic areas of the Siberian coast and the industrial sections to the south and west. Flowing north from the southern borders of Siberia, the Ob, Irtysh, Yenisei, and Lena Rivers with their tributaries provide the link from the Trans-Siberian Railroad to the Arctic Seas. The Soviets have spent considerable effort in developing these water routes and adequate loading facilities are available at the rail junction points of Omsk, Novosibirsk, Krasnoyarsk, Irkutsk and Ust Kut. Limiting the use of these routes is the severe cold which restricts navigation to the period of May-June to October-November. While it is impossible to estimate the freight capacity of these rivers, it is safe to say that it would probably require an entire summer to build up a base for a major Arctic operation assuming a river were the only means of transport. However, it would be possible to maintain an established naval or air base without too much drain on normal traffic.

109. Farther to the west, connecting the Leningrad-Moscow industrial area and the Baltic Sea with the White Sea, is the Baltic-White Sea Canal. Its strategic importance lies in its value as a transfer route to the Arctic for ships of the Baltic Fleet and (since the completion of the Volga-Don Canal in 1952) the Black Sea Fleet. Ships up to destroyer size can transit the Baltic-White Sea Canal, a trip of 4 to 5 days, during the months of May through October. Thus, a large-scale northern operation could be organized during the summer months without detection.

Shipyards

110. Few shipyards are located in the Arctic and sub-Arctic area. It is known that there are shipyards at Murmansk, Molotovsk, about 20 miles west of Archangel, and the Krasnaya Kuzmitsa Yard immediately north of the same city. These yards are reported to have heating sheds for personnel assigned to outside work during the winter months. Although special clothing is supposedly furnished their workers, it is believed to be rather inadequate. Welding is done indoors during cold weather. Molotovsk has covered building ways providing for temperatures above the minimum allowed for welding -- even when outside temperatures drop to -40° and -50°F. All major shops at Molotovsk are connected by railroad. Steam and water lines are protected in heated underground tunnels. Icebreakers stationed at this yard keep access lanes open during the winter months. It is believed that new construction is so planned that no launchings occur during the winter -- although they could probably be carried out with special preparations.

111. Underwater repairs to ships have been accomplished in the Arctic without the use of conventional drydocks. To be able to repair plating below the waterline, the ship is purposely left to be frozen in the ice. By cutting top sections of the ice next to ship's hull, the thinner areas of ice refreeze from the underside and build up successive layers of bouyant ice under the ship. Repetition of this process physically lifts up the hull after which a working space can be cleared adjacent to the hull area to be repaired. According to reports, even the keel can be reached by this method.

112. Requirements of fuel and lubricants for the Northern Fleet operating forces under wartime conditions will be about 981,000 long tons for one year. There are facilities at Murmansk and Archangel capable of handling these fuel requirements, assuming rail and port installations are not damaged.

113. Naval Facilities. Except for the Far East area, and Soviet Arctic naval operation will have to be staged from the European Arctic coasts and will be dependent upon the only ports of significant size, Archangel and Murmansk. Archangel has a maximum handling capacity of 28-30,000 long tons per 20 hour day (or about 15,000 actual) and Murmansk has a maximum capacity of 7-8,000 long tons or in practice about 4-5,000. It is estimated that railroads in and out of the ports could supply the area as rapidly as ships could be loaded and moved from the port. None of the other transport links from the coast to the industrial areas will contribute significantly. In the Far East area, there are several small capacity ports including Petropavlovsk and Provideniya through which Arctic naval operations could be staged during the navigable period of the year.

114. Civil Air Routes. The Soviet Arctic is serviced from Murmansk to Uelen (on Bering Strait) by a net of airlines and a system of airports along the Arctic coast and inland, principally along the navigable rivers. Both civil and military air transports operate in the Arctic. Scheduled flying is hampered by weather, lack of navigational aids, absence of emergency fields between widely separated stops, and inadequate vacilities at the airports. Since the last war, there have been indications of a fairly extensive Soviet effort to improve airfield and navigation facilities in Arctic areas, although again the results achieved are not known in any detail.

115. Air Facilities. Throughout the Soviet Arctic, there are suitable airfield sites. In winter, the many frozen lakes in Arctic and sub-Arctic regions afford an almost unlimited number of usable airfield sites. In summer, many of these lakes could be used for seaplane operations. Since airfield locations in this area are determined by economics rather than topography, and since the economic development of the Soviet Arctic is concentrated along the great Siberian rivers, it is anticipated that airfield development, both commercial and military, will be confined to these arteries of transportation and along the coast. An exception is the region in Northeast Siberia which can be supplied by the Magadan highway.

116. Practically all of the land north of 60° presents serious obstacles to airfield construction. Most of it has a subsoil that is permanently frozen to varying depths and undergoes varying degrees of thaw in summer. Nevertheless, the Soviet Union has found ways to cope with the permafrost, and much of the material required to construct simple airfields is either locally available or can be transported down the Siberian rivers to the sites. The raw materials for cement and asphalt surfaces are available near a few sites, notably at Ukhta and Yakutsk.

117. In winter, aircraft can land almost anywhere on the ice and snow, whether equipped with wheels or skis, or not. Snow removal from airstrips is not always necessary. It is known that the Soviet Union has used snow rollers with good results. Temporary bases can therefore be established quite easily in advanced areas. In summer, conditions are quiet different, there being practically no landing areas except at permanent or semi-permanent bases. It is known that the Soviet Union has been able to use float-planes in summer and ski-planes in winter in the Arctic.

7-27-0-1

JOINT INTELLIGENCE COMMITTEE

Extract from the minutes of the 331st meeting held on 3 Dec 52.

IV. SOVIET CAPABILITIES FOR ARCTIC OPERATIONS (SECRET)

10. The Committee had received copies of the US JIC paper "Estimate of Soviet Capabilities for the Conduct of Military Operations in Arctic and Sub-Arctic Environments" (JIC 589/1), and at the 310th meeting had agreed that information of the type contained in the paper should be made available to training, operations, planning, and research and development staffs. The JIS had prepared for JIC approval a paper "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic" (JIC 61(52)) to meet this requirement.

Also for consideration was a proposed distribution list for JIC 61(52).

(CSC 7-27-0-1 (JIC) of 18 Nov and 1 Dec 52)

11. It was agreed, after discussion, to approve JIC 61(52) subject to minor amendments to be submitted by DSI, and to concur in the proposed distribution.

CANADA

IN REPLY PLEASE QUOTE
No. CSC 7-27-0-1 (JIC)

Department of National Defence

SECRET

JOINT STAFF

JOINT INTELLIGENCE COMMITTEE

ADDRESS REPLY TO
CHAIRMAN
CHIEFS OF STAFF,
OTTAWA.

1 Dec 52

MEMORANDUM FOR THE JIC:

Soviet Capabilities for Arctic Operations

1. Under Item 4 of the agenda for the 331st meeting the JIC is to consider the paper on Soviet capabilities for Arctic operations. The following distribution of the paper is submitted for approval at the meeting on 3 Dec:

Navy

Flag Officer, Atlantic Coast
Flag Officer, Pacific Coast
Director of Naval Plans and Operations
Director of Weapons and Training
Director of Naval Communications
Director of Naval Organization
ACNS (Air)
Chief of Naval Technical Services
Medical Director General
Director of Fleet Supply

Army

GOsC, All Commands
Commandant, Fort Churchill
Commander, NWHS
Commandant, CJATC (Army)
Director of Military Operations and Plans
Director of Military Training
Director of Armour
Director of Artillery
Director of Infantry
DMI
Director of Weapons and Development
Quartermaster General
Deputy Quartermaster General (Development and Design)
Chief Engineer
Director of Supply and Transport
Director of Ordnance Services
Director of Armament Development
Director of Engineer Development
Director of Electronic and Communications Development
Canadian Army Staff College

Air Force

Air Defence Command
Tactical Air Group
Chief of Air Operations
Chief of Plans and Intelligence
Air Member for Technical Services
DAI

DRB

Supt. of each Research Establishment
HQ Staff Officers (Arctic, Environmental Protection, Medical, Special Weapons, Armament, Civil Defence, Operational Research, Aeronautics, Telecommunications, Project Co-ordination)
DSI (for Chairman, Vice Chairman, Chiefs of Divisions, etc.)

RCMP

2 copies.

(J.E. Beswick)
Major,
Secretary.

JEB/5459/fp

SECRET

NSS 1480-146/37
CSC/JS

NOV 28 2 48 PM '52

MEMORANDUM TO: Secretary,
Joint Intelligence Committee.

SOVIET CAPABILITIES FOR ARCTIC OPERATIONS

Reference: CSC 7-27-0-1 (JIC) dated 18 November, 1952.

It is suggested that this paper be distributed within the Naval Service as follows:

FOAC, Flag Officer Atlantic Coast
FOPC, Flag Officer Pacific Coast
DNPO, Director Naval Plans & Operations
DWT, Director Tgt/Weapons & Training
DN COM., Director of Naval Communications
DNO, Director of Naval Organization
ACNS (AIR), Chief of Naval Technical Services
CNTS, Medical Director General
MDG. Director of Stores Supply
DFS.

(J.C. Pratt),
Commander, RCN,
DIRECTOR OF NAVAL INTELLIGENCE.

O T T A W A,
27 November, 1952.

SECRET

DEPARTMENT OF NATIONAL DEFENCE
CANADA

IN REPLY PLEASE QUOTE
DRJIC 7-27-0-1 (DSI)

DEFENCE RESEARCH BOARD

RESTRICTED

Ottawa, Ontario,
29 November, 1952.

Secretary,
Joint Intelligence Committee,
Room 4801,
"A" Building,
Ottawa.

Attn: Maj. J.E. Beswick

1. DRB requirements for JIC Paper JIC 61(52) on Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic are as follows:

Supt. of each Research Establishment	-	14
HQ Staff Officers (Arctic, Environmental Protection, Medical, Special Weapons, Armament, Civil Defence, Operational Research, Aeronautics, Telecommunications, Project Coordination)	-	10
DSI (for Chairman, Vice Chairman, Chiefs of Division etc.)	-	6
Total		30

(R. A. Berry)
for Director of Scientific Intelligence

100M—3-52 (56-3375)

SECRET

DAI/TS.1603-5

MEMORANDUM

28 Nov 52

Secretary, JIC

Distribution/JIC 61/52

1 Reference is made to CSC 7-27-0-1 (JIC) para 3.

2 The distribution within the RCAF as suggested by this Directorate is as follows:

2 copies - ADC
1 copy - TAGp
1 copy - CAOps
1 copy - CPlansI
1 copy - AMTS
3 copies - DAI

Air Defence Command
Tactical Air Group
Chief Air Operations Intelligence
Chief of Plans and
Air Member for Technical Services

G.W. Kusiar W/C.
(G.W. Kusiar) W/C
for DAI

DEPARTMENT OF NATIONAL DEFENCE
CANADA

IN REPLY PLEASE QUOTE

DEFENCE RESEARCH BOARD

SECRET

Ottawa, Ontario.
25 November, 1952.

Secretary,
Joint Intelligence Committee

Soviet Capabilities for Arctic Operations
JIB Comments

1. No special distribution is required by JIB. The DRB distribution will be forthcoming from DSI.

2. The acknowledgement to the U.S. JIC on the 'Contents' page is too begrudging and it is doubtful if reference should be made to the U.S. JIC paper by number.

3. The following minor editorial changes are suggested:

Para 58 - Line nine, for "because", substitute "becomes".

Para 100 - Line five, for "populated", substitute "sheltered", and for "within", substitute "south of".

Para 109 - Line four, for "after", substitute "since".

JIS to note and return please

(I. Bowen)
Director,
Joint Intelligence Bureau.

100M—3-52 (56-3375)

SECRET

ARMY HEADQUARTERS

24 Nov 52.

Secretary,
Joint Intelligence Committee.

Soviet Capabilities for Arctic Operations

1 It is requested that the marginally noted paper be distributed within the Army, as follows:

GOsC, All Commands
Comd, Fort Churchill
Comd, NWHS
Comd, CJATC (Army)
DMO&P Director of Military Operations & Plans
DMT " " Training
D Armd " of Armour
D Arty " Artillery
D Inf " Infantry
DMI " Weapons & Development
DWD
QMG Quartermaster General
DQMG (Dev & Design) Deputy Quartermaster General (Development & Design)
CE Chief Engineer
DST Director of Supplies & Transport
DOS " Ordnance Services
DAD " Armament Development
DED " Engineers
DECD " Electronics & Communication Development
Cdn Army Staff College

RCMP - 2 cys

(NS Cuthbert)
Colonel
DMI

SECRET

CANADA

IN REPLY PLEASE QUOTE
No. CSC 7-27-0-1 (JIC)

Department of National Defence

SECRET

JOINT STAFF

ADDRESS REPLY TO
CHAIRMAN
CHIEFS OF STAFF,
OTTAWA.

JOINT INTELLIGENCE COMMITTEE

18 Nov 52

G. de T. Glazebrook, Esq.,
Dept. of External Affairs.
DMI
DAI
DNI
DSI
RCMP
JIB

Soviet Capabilities for Arctic Operations

1. At the 310th meeting the Committee directed the JIS to prepare a paper along the lines of the US JIC paper JIC 589/1 entitled "Estimate of Soviet Capabilities for the Conduct of Military Operations in Arctic and Sub-Arctic Environments". The purpose of the Canadian paper was to make available information of the type contained in the US paper to training, operations, planning, and research and development staffs.

2. Attached is a copy of JIC 61(52) entitled "Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic" which is now submitted to the JIC for approval. This paper has already been considered by the directorates in a draft stage.

3. The attached paper and the distribution of the paper will be considered at an early meeting of the Committee. In order to assist in the determination of the distribution it will be appreciated if the suggested distribution for your service, etc., could be submitted to the Secretary by 28 Nov.

(J.E. Beswick)
Major,
Secretary.

Enc.

JEB/5459/fp

c.c. JIS

12

SECRET

JIC 61(52)

November, 1952

Copy No. (8) 8

Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic

CONTENTS

NOTE: Acknowledgement is due to US JIC 589/1, on the content of which a large part of the material in this paper has been based.

New note

61

SECRET

November, 1952

JIC 61(52)

Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic

INTRODUCTION

1. This paper discusses the capabilities of the Soviet Union to conduct military operations in an Arctic or sub-Arctic environment - either in the Soviet Union itself, or in North America. Soviet capabilities are not related in this paper to such factors as numbers of suitably trained troops available: the discussion is confined to technical and tactical matters.

2. For the purposes of this paper the Arctic is defined as the area north of the continental tree line (or, for naval purposes, that sea area in which ice is a serious barrier to navigation). The sub-Arctic is defined as the area between the continental tree line and the extensively settled zone. On the basis of this definition, about three-quarters of the Soviet Union is sub-Arctic, extending south from the tree line to about 60°N. (the latitude of Leningrad) in European Russia, and to the border of the Kazakh SSR and the border of the Soviet Union in Asiatic Russia.

CHARACTERISTICS OF THE ARCTIC AND SUB-ARCTIC

3. The following characteristics of the environment will influence operations:

(a) Extreme Cold. The effects of extreme cold will be reduced by proper planning for and provision of suitable clothing, equipment, shelter, means of transportation, supplies, and means of evacuation. The effects of extreme cold on men, material and weapons will slow activity. These factors must be taken into consideration in time and space calculations.

(b) Snow Cover. Arctic regions are not associated with extreme snowfall. Rather, snowfall is relatively light, except in areas adjoining open water. In many areas the total snowfall during an average winter will probably not exceed one or two feet and windswept areas may be bare of snow. Nevertheless, snow cover, where it occurs (particularly in the sub-Arctic), aids the normal movement and operations of troops suitably equipped and trained, but reduces mobility for troops lacking proper equipment and training. While it makes concealment more difficult, snow correspondingly facilitates deception and changes the contours of the ground. Snow cover reduces the effect of fire of weapons which burst on contact with the ground.

(c) Seasonal Transition and Variability of Weather

(i) Sudden changes in weather are common. These changes include severe frosts, mild weather, sudden freezing, snowstorms, strong winds, and dense fogs. Accurate weather forecasts are essential to guard against harmful effects and to enable tactical advantages to be seized.

(ii) Major problems arise during the thaw period. The difficulties of movement progressively increase as the ice of waterways weakens and breaks. Temporary winter roads and airfields disintegrate; permanent ones may become unusable. Rivers flood. Careful planning and provisioning to counteract or surmount difficulties arising from such factors are essential if forces are not to be immobilized for periods up to several weeks. Winter field fortifications become unusable and must be replaced by construction suitable for the summer months. Camouflage must be altered. In winter the main requirement of clothing and shelter is to protect against the cold; in summer it is to give protection against wet and against insects.

(iii) Operations during the summer in the sub-Arctic do not differ materially from operations in other undeveloped regions. In the Arctic, extensive areas underlaid by permafrost become bogs in summertime. Long hours of daylight decrease the possibility of surprise. Insects may cause physical discomfort to troops and will make special protective measures necessary.

(iv) The "freeze-up" season has less effect on movement than the "break-up". It is often well into the New Year, however, before heavy aircraft can land on sea ice and before trucks and tractors can move freely.

(d) Sparse Settlement. Industries, supplies, quartering facilities, and lines of communications are limited. Their control or destruction becomes important during the winter. Facilities for replacement are negligible. In areas where indigenous population is lacking, military personnel will have to perform tasks for which civilians are used in other areas, e.g. construction of roads. The existence of an acclimatized population subject to discipline in Soviet labor camps in Northern Russia should, however, be noted.

(e) Roads and Railways. In most areas roads and railroads are almost non-existent. In permafrost areas construction is difficult and maintenance requirements are very large. The lack of stone or gravel in some areas is a handicap to rail and road construction. Traffic interruptions due to seasonal changes or bad weather can be anticipated.

(f) Forested Areas. Large forested areas in the sub-Arctic have a great effect upon operations. They offer concealment and give reasonable protection against bad weather, but troops require special training to move, live, and operate effectively in these areas. Forest fires are easily caused in sub-Arctic forests in summer and require special attention.

(g) Numerous Lakes and Waterways. When these are frozen (for about 6 to 8 months of the year), they often provide a good road system, and natural airstrips, although pressure ridges may form a considerable hazard on the larger lakes and along the sea coast. In summer, waterways may be the only surface means of transportation available.

(h) Lack of Maps. For large areas, maps are often non-existent or unreliable. This makes operational planning difficult and requires special emphasis on reconnaissance and navigation. The importance of air photos increases.

(i) Difficulty of Navigation. Difficulty of navigation is caused by magnetic disturbances (although less frequently in Siberia than in North America), and lack of identifiable features. Special navigation equipment and guide detachments are required.

(j) Daylight and Darkness. Short days and long nights decrease the amount of daylight available for working and fighting in winter. Nights are often made bright by the moon, northern lights and stars. The possibilities of surprise are thus increased. In summer, the short nights may permit military activity throughout whole twenty-four hour periods. At times an overcast sky and snowcovered terrain create a certain condition of visibility ("Arctic Whiteout") which makes recognition of irregularities in terrain very difficult. "Ground drift" is a condition wherein wind lifts and drifts loose snow to a height of some ten to fifteen feet, above which is normally bright sunshine, and underneath an object cannot be distinguished twenty feet away.

BRIEF HISTORY OF SOVIET MILITARY OPERATIONS IN THE ARCTIC AND SUBARCTIC

4. The only large-scale campaign conducted by the Soviet Army in the Arctic or sub-Arctic during the Second World War was that against Finland. Initially in this campaign, Soviet equipment was poorly adapted for such operations, but, after efforts to improve cold weather tactics and techniques, the efficiency of the equipment and the proficiency of troops (especially that of elite ski troops) gradually improved. In addition, ski brigades, attached to army commands, were employed on special missions, and ski battalions were formed within each rifle division. The battalions usually used snow shoes rather than skis and their training and efficiency were inferior to those of the brigades. It should be noted, however, that the relatively light snow and low temperatures would limit ski activity in the true Arctic, for it is impossible to ski on snow at temperatures below about - 40 degrees Fahrenheit. Motor-sled battalions, with exceptional speed over snow, were developed, but are not known to have been used in battle.

5. The Soviet campaign in Finland was not characterized by any special techniques or tactics that were not equally evident in the major campaigns during the severe winters on the whole front. As the war progressed, however, the Soviet armies became better trained in certain obvious facets of employment, such as, for example, snow camouflage, construction of snow positions, movement of heavy weapons on improvised runners, use of snow ploughs on supply routes, etc.

6. Soviet naval operations in the Arctic and sub-Arctic during the Second World War were mainly confined to submarine attacks off the Norwegian Arctic coast and the Barents and Kara Seas. Submarines in the area apparently operated independently and not in packs. Surface operations in northern waters consisted chiefly of escort duty for incoming convoys and MTB attacks against German convoys on the Norwegian coast. Surface and submarine minelaying were carried out efficiently. Since the war, Soviet operations on the Northern Sea Route have provided experience in the field.

7. In the Finnish and German wars, Soviet military aircraft flew regularly at temperatures of - 30 to - 40 degrees Fahrenheit. In fact, on account of Soviet deficiencies in instrument flying, heavy cloud hampered activity more than cold weather. Frozen lakes were used as landing fields without difficulty, and two-engined aircraft were normally based on such fields. Some four-engined aircraft (TB-7 and PE-8 - gross weight about 80,000 lbs.) were also operated from lakes during the severe winter of 1939-1940. At the beginning of the war many Soviet aircraft were equipped with fixed or retractable skis, although this idea was apparently later abandoned, and special tyres were used on conventional landing gear. Since the war, Soviet flying operations along the Northern Sea Route and in Siberia have furnished further experience in Arctic and sub-Arctic flying.

PRESENT SOVIET TRAINING FOR ARCTIC AND SUB-ARCTIC OPERATIONS

8. There is no evidence of any special Soviet effort to train the Soviet army in Arctic and sub-Arctic operations, except for unconfirmed reports of exercises under exceptionally severe conditions apparently for the purpose of experimenting with new techniques and equipment. Normally, no special techniques or equipment are employed for cold weather training, and there is evidence that normal training is cancelled when the weather is especially bad.

9. It is probable that ski training takes place in ordinary units or in special units or in both. A Soviet Army Sledge Dog Training School, where special sleds and harnesses are developed, has been indentified.

10. It is doubtful if the Soviet Navy carries out any systematic plan for the rotation of personnel between duty in the Arctic and sub-Arctic and duty elsewhere, although some rotation probably takes place in the normal course of duty.

11. Again, there is no evidence of rotation of air force personnel to Arctic areas for special training, although the general Soviet practice of rotating air units could be expected to lead to some units being based in the north. There has, however, been a report of Polish youths being trained for the "Arctic Air Force."

12. Although normal rotation would be expected to provide training for some units, the military air strength north of 60 degrees North latitude is only a small portion of the total air forces of the Soviet Union. There is evidence of concentrations of aircraft in the White Sea and Archangel military districts and of at least one Soviet fighter regiment stationed in north-east Siberia. Apart from units deployed in Arctic regions the climatic condition of a large part of the remainder of the Soviet Union is so rigorous that normal winter operations would to some extent constitute Arctic training.

Ground Force Operations

13. Attack. Before the approach march civilian labour (where available) may be used to assist the Army in laying roads and tracks for different types of transportation. "Column roads" are built for wheeled and tracked vehicles; existing roads are improved, but can only be used by sleds; and "winter roads" are laid alongside them. "Corduroy roads" of logs and mats are made to allow artillery to deploy. All roads are carefully flagged or marked with painted luminous stakes. Ice-bridges are made from brushwood which, with water poured over it, remains solid well into the thaw period. Frozen lakes and rivers may be used as airfields.

14. The standard light sled used during the war by the Red Army was the volokusha. Drawn by two skiers, it can carry one light or heavy machine gun, a mortar, ammunition, supplies, or one casualty. It can also be employed as a firing platform for the heavy machine gun. Motor sleds, driven by propellers, were extremely effective both as combat vehicles and for transportation. The larger model can carry the driver and either four men with full equipment or 880 pounds of supplies. Sled trains, comprising a tractor and up to six sleds, are employed for transporting supplies. Infantry sometimes operates in armoured sleds, drawn by tanks or motor vehicles. Artillery may be mounted on sleds, runners or skis. Much use is made of pack artillery, and horse transportation is often used instead of motor vehicles.

15. Tanks with specially adapted wide tracks operate successfully in snow up to 20 inches in depth. When the snow is between 20 and 30 inches deep, their use is restricted. They move most easily over freshly fallen snow; a thick crust or wet snow tendsto clog and even break the tracks. They are provided with special equipment, including mats and grousers, for crossing snowdrifts and ice-covered slopes.

16. Movement in winter is generally slower, as columns are mainly road-bound, except for troops equipped with skis or snowshoes. If the snow is more than 12 inches deep the rate of march is reduced still further. Owing to the difficulty of rapid dispersal in the event of air attack, spacing between columns and echelons is increased by day. Motorized artillery and tanks generally move in independent columns on the best roads; but in very deep snow, in broken country and when enemy opposition is expected, tanks are distributed among the other columns in small groups in order to support the infantry deployment. As tank tracks are clearly visible from the air, armour seldom adopts any but column formation and, if possible, moves during snowstorms. The last tank tows a special roller, a coil of barbed wire or a tree trunk in order to obliterate the tracks. Ski units move in a number of parallel groups, in file or column of fours. Traffic control posts are equipped with supplies of sand and with snow-plows. Ration and warming posts are established on all supply routes. For the prevention of frostbite feet are bound with paper, infantry move alternatively with and without skis, and troops watch each other for symptons. During rests special details keep awake for the sole purpose of turning sleeping men over every 15 or 20 minutes to prevent freezing. If the state of the roads is bad, halts are made more frequently but are shorter. There are no long halts. Bivouacs are made in built-up areas, woods, or hollows with protection from the wind. Soviet troops show great skill in setting up snow huts (igloos) and wind shelters and in digging burrows in the snow. A common shelter known as the shalaski can be constructed very rapidly from branches and twigs covered with snow.

17. The following data are taken from Soviet manuals:

Rates of March:

	Kilometers per hour	Miles per hour
Infantry	3-4	1 7/8 - 2 1/2
Infantry (Snow over 12 inches deep)	2-3	1 1/4 - 1 7/8
Single skier	6-8	3 3/4 - 5
Small ski unit	4-6	2 1/2 - 3 3/4
Large ski unit	3-4	1 7/8 - 2 1/2
Motor sled	20-25	12 1/2 - 15 5/8

The rate of march of vehicles and cavalry is approximately equivalent to that of ski troops.

Days' March (6-7 hours):

	Kilometers	Miles
Infantry	18-24	11-15
Ski unit	30-40	19-25
Motor sled	100-110	63-69

Thickness of Ice

Infantry can cross ice 4 inches thick.
Medium tanks can cross ice 28 inches thick.
Heavy tanks can cross ice 32-40 inches thick.

Thickness of Snow-Tanks

Snow under 20 inches; tanks employed as usual.
Snow 20-30 inches; tanks move only short distances.
Snow over 30 inches; tanks not used.

18. Protection on the march is provided by groups of ski troops with submachine guns, towed heavy machine guns, motars, and anti-tank weapons. Troops travelling in motor sleds or tank-drawn sleds can also be employed. All protective detachments are accompanied by strong groups of engineers to reconnoitre the ground and organize the clearing and repair of roads for the main body. When an engagement is expected, reconnaissance patrols are put under the personal command of senior officers, who later take charge of the deployment. If tanks are available, a strong tank group moves in rear of the advance guard. Where stretches of ice have to be crossed, strong anti-aircraft and fighter protection is provided and emergency crossing equipment is carried, as there is a danger of the ice being broken by enemy artillery or bomber attacks.

19. Reconnaissance. This is carried out by troops on skis or, occasionally, snowshoes. Infantry, in sleds drawn by tanks or motor vehicles, can be used for long-range or shock tasks, and motor sled units for raids and patrolling, especially across ice. Dogs are often employed by patrols. Groups of picked men with skis or snowshoes are employed for long-range patrols behind the enemy lines.

Members of patrols carefully follow each other's trails, even placing their sticks in the same holes. When returning, however, they use a different route, their old tracks often being mined either by themselves or the enemy. Even in intense cold these troops seldom spend the night in inhabited areas but choose thickets, woods, or gullies and build improvised shelters. Partisans or paratroops were sometimes used in the Second World War to assist patrols in executing their tasks.

20. Preparation. The assembly area should be close to the jump-off position so that troops are not unduly fatigued before battle by a lengthy and arduous approach. Snow huts and dugouts should be constructed in the assembly area for warmth and protection. In deep snow the jump-off trench is dug very close to the enemy's forward defenses and sometimes even outflanks them. The trenches must be occupied for only a very short time before attack, or the men may freeze to death. For armour, a jump-off position with shallow snow is chosen if possible. Tank approach routes are very carefully reconnoitred and marked. Everything is painted white and personnel are given white camouflage clothing. Collecting posts are set up close to each other, if possible in huts or villages. Sledges and stretchers on skis are used for the evacuation of wounded, and stretcher-bearers and first-aid parties have skis. Every effort is made to keep the wounded warm with fur rugs. During artillery and air preparation the main object is to prevent the enemy from getting rest and warmth. In order to keep up constant bombing attacks, landing fields are prepared close to the front.

21. The Assault. Soviet troops take advantage of unfavourable weather conditions in launching tactical assaults with small units. Plans are flexible so that they can be adapted to sudden changes in the weather. The attack is initiated by shock groups of submachine gunners, who usually operate on skis. The first infantry wave attacks without skis if the jump-off position is close to the enemy's lines, if the snow is less than 12 inches deep or has a hard crust, or if there are obstacles which would make skis an encumbrance. When skis are not worn, squads are detailed to bring them up in the rear of the leading troops. The second and third waves and the reserves nearly always consist of troops on skis, and groups of skiers with support weapons are formed for attacking strong points. The interval between waves is reduced, especially if the snow is more than 12 inches deep. Close support is provided by the artillery mounted on skis, runners, or sleds, with accompanying detachments of infantry to help them forward. Self-propelled guns and tanks are used in preference to ordinary artillery. Infantry-support weapons are often sub-allotted to platoons. Armour is not split into small groups but operates in mass. Tanks advance on a broad front, usually in two waves, and as far as possible in a straight line. They generally choose ground where snow is shallow. Tank and mechanized units are given especially strong support by artillery, anti-tank weapons, and infantry-support weapons, and are always accompanied by ski units. The favorite manoeuvre is an outflanking movement by the main forces with a holding action from the front. If an attack is unsuccessful the troops often remain in slit trenches in the snow until nightfall, when they re-group and launch another effort. The protection of re-grouping is one of the special tasks of ski troops.

22. Exploitation and Pursuit. The last phase of the attack is usually a wide outflanking and enveloping movement largely executed by ski troops and motor sleds. Cavalry, tanks, and motorized infantry are employed only if the snow is less than 20 inches deep and if there is an adequate road network. Bold thrusts to the rear by even small ski groups may have decisive results. The skiers receive the closest possible support form armour and artillery. The special task of the artillery is to keep the enemy away from the roads and areas of shallow snow, and efforts are

made to attack columns at points where they cannot deploy because of the state of the ground. Aircraft are used not only for attacks on rear areas and reserves but also for supporting ski spearheads making deep penetrations beyond the range of their own artillery and in country unsuitable for tanks.

23. Defence. Strongpoints and "defense focal points" are located, if possible, in wooded countryside with numerous built-up areas for billeting purposes. The main defence line is normally on, or in rear of, natural obstacles; all cover forward of the line is destroyed if possible, so that the enemy's forces, obliged to remain in the open, become weakened by their privations. In the same way it is considered good policy to locate the main defence line, or vital parts of it, on high ground, as enemy troops attacking uphill become exhausted more rapidly.

24. Since troops cannot operate away from shelter for long periods, the maintenance of continuous fire cover for the whole of the ground forward of the main defenses is often impossible; active patrolling is, therefore, maintained throughout the 24 hours by ski patrols. Obstacles and mines are laid in front of the forward position and are supplemented by defensive fire from artillery and mortars.

25. Reserves are kept under cover in billets or dugouts and are given training on skis to increase their mobility. Ski-runs are often constructed for them in the most likely directions in which they may be employed; these ski-runs are provided with obstacles that can be hastily erected to block them in an emergency.

26. Engineers play a vital role in winter defence; in the preparation of billets, dugouts, and winter camouflage, and in road maintenance along the lines of communication and in forward areas. Artillery (including mortars) has the special task of denying to the enemy the use of roads and villages, forcing him to spend as much time as possible deployed in open country. Routes for tanks are carefully reconnoitered, perpared, and maintained. Measures for warming up tank engines and arrangements for quick starting are constantly under review. Little is known of Soviet adaptations of normal maintenance techniques to Arctic and sub-Arctic weather, beyond the employment of shelters for warming equipment and protecting technicians.

Naval Operations

27. Maintenance of Equipment. The Soviet Union has demonstrated a capability to maintain equipment for air and sea operations in extremely low temperatures. However, daily maintenance will require some kind of shelter, and periodic inspections and major repairs will involve moving vessels and aircraft, if possible, to suitable bases.

28. Mobility. Naval mobility in the Arctic is limited by ice conditions. The Soviet Union, perhaps more than any other nation in the world, has been keenly interested in the study of naval operations in Arctic ice. From their research and experiment in this field, the Soviet Union has acquired knowledge and experience of the Arctic, which it has put into practice. The most notable of its accomplishments is the Northern Sea Route, the development of which emphasized the Soviet capability of moving naval forces through Arctic regions. The capability is, of course limited by the availability of icebreakers and the length of the navigational season.

29. Navigation. Navigation in Arctic waters differs substantially from that of other oceans. In this region, tips of the warm equatorial currents meet cold water flowing from the Polar ice cap and cause peculiar stratification of the water. The cooling of the air over the ice results in fogs, mirages and distorted pictures. During certain periods of the year, celestial navigation is extremely difficult because of cloud cover and lack of visibility of the horizon. The proximity of the North Pole creates appreciable alterations of compass deviation. Difficulties with gyro-compasses have also been reported.

30. Radio communications suffer occasional interruption in the Arctic regions of North America and interruption to a slightly lesser extent in Siberia and Arctic Russia. Moreover, particular caution must be exercised in navigating along the ice edge and rocky coasts which have been scantily surveyed. Varying currents and inaccurate depth data on charts pose additional problems to dead reckoning navigation. However, the Soviet Union has probably equipped its units with better and more accurate hydrographic materials than those which are available to foreign mariners.

31. Radar has tremendously increased the capabilities of navigating and piloting under bad weather conditions. On the fringes of the pack and in areas where icebergs may be encountered, surface search radar will detect icebergs at distances sufficient to avoid collision.

32. The navigation of submarines under ice is an especially difficult problem, but we have no knowledge of the Soviet position in this field.

Air Operations

33. Apart from the staging of aircraft into outlying Arctic areas for offensive strikes in the event of war, it is probable that the basic Arctic air mission will remain predominatly defensive until communications facilities are improved enough to provide the logistic support necessary for sustained offensive air warfare.

34. Maintenance. The Soviet Union has demonstrated its capability to maintain equipment for air operations in extremely low temperatures. Daily maintenance will require some kind of shelter, and periodic inspections and major repairs will involve flying the aircraft, if possible, to suitable bases.

35. Airborne Operations. The great distances and extreme lack of land transportation, and the difficulty of conducting ground operations, emphasize the importance of airborne operations in Arctic areas.

36. Little is known about present Soviet training for military airborne operations in the Arctic, but there are now estimated to be some 100,000 qualified paratroopers on active duty in the Soviet Union; air-transportable troops probably number another 100,000.

37. Navigation. Aerial navigation in the Arctic and sub-Arctic is difficult. The Soviet Union has carried out much research on navigational aids and the necessary theoretical knowledge for successful polar navigation exists. Navigation in the Arctic with the equipment now available is probably within Soviet capability.

38. Supply. All supplies and munitions for Arctic air operations must be procured from the industrial areas of the countries involved. In Western Russia, this area lies between 50° and 60° north latitude--approximately 1,000 nautical miles nearer the North Pole than a comparable area in the United States. Nevertheless, the length of the Soviet lines of communication, plus the manifold difficulties presented to their supply organizations by the conditions prevalent in Arctic regions, would entail the construction of large storage facilities close to the theatre of operations. This would be an added burden because of the construction requirements for this storage.

39. In general, the problems of supplying air operations in Arctic and sub-Arctic areas are less serious than those for ground operations. Permanent and semi-permanent air bases will tend to be located where logistical support is readily available. Consequently, there will be more facilities of all kinds at these bases.

40. In summer, logistic support of air bases along the Arctic coast and the Siberian rivers may be simplified by using water transportation. However, the logistical problems of outlying units will be magnified. The frozen soil and permafrost prevent the melting snow and ice from draining, and this causes extensive floods. The soft ground, swamp-like after spring thaws, forces sleds to be used in some areas in summer as well as in winter. Summer is also the worst season for flying in the Arctic, especialy for reconnaissance and ground-supply. Nevertheless, logistics for air operations will be less adversely affected in summer than will those for ground operations. Another main effect of the summer season -- insects -- will be felt in reduction of efficiency of personnel.

41. Ground operations in Arctic and sub-Arctic terrain will indirectly affect air operations in that more supply and evacuation by air will be required by ground troops. In winter, cargo planes can be landed almost anywhere and unloaded; but in summer, most of the supplies will have to be air-dropped. Similarly, evacuation will be fairly simple in winter but difficult in summer. To overcome the difficulties imposed by the terrain and the lack of landing facilities in summer, the extensive use of helicopters for liaison, reconnaissance, observation, and supply and evacuation would appear to be one solution. It is not known what specific progress the Soviet Union has made in the development and production of helicopters, although it is known that some have been produced and nine helicopters of a new model were demonstrated in the July 1951 Air Show in Moscow.

Meteorology

42. The conditions which prevail in the Arctic make adequate weather and ice forecasts essential for successful operation of air and naval forces in the area. An extensive system of attended and unattended weather stations has been established by the Soviet Union in the Arctic and along the Northern Sea Route for this purpose. The use of aircraft in daily weather reconnaissance flights, the location of automatic weather stations in remote northern areas and the establishment of surface stations on ice islands, can contribute appreciably to more accurate weather forecasting. The employment of submarines within the polar ice pack is a possible future aid to such forecasting. All of these means for gathering weather information are believed to be well within the capability of the Soviet Union. Knowledge of Arctic forecasting procedures and problems is believed to be very advanced.

43. Ice Forecasting The Soviet Union has paid considerable attention to ice forecasting and an elaborate organization, centred at Leningrad, has been created for this purpose. By 1940, forecasts for 5 or 10 day periods were being made for the Kara and Lapter Seas from Dikson and for the eastern seas from an ice breaker. 75% correctness was claimed for long-term forcasts in 1940, and from 65-85% correctness for short-term forecasts in 1939.

Intelligence Operations

44. The Soviet Union's capabilities for intelligence operations in the Arctic and sub-Arctic are difficult to assess. These areas impose unusual problems: the settlements are few and far between, and the population density is insufficient for obtaining covert intelligence; the territory is vast and there are few accurately charted, indentifiable landmarks. The wind-blown snow, a highly effective natural camouflage for immobile objects, sifts into crevices, distorts appearances and merges landscapes until familiar things and terrain are unrecognizable from the air; photo reconnaissance is relatively ineffective during part of the year because of clouds and fog, and because shadows of the snow cover have little relation to the true shapes of blanketed objects. The seasonal variations of daylight and darkness, and also the conditions of climate and weather, restrict intelligence operations, and detailed maps of many areas are almost completely lacking.

45. Soviet doctrine stresses various means for effecting reconnaissance and intelligence collection. Parachute patrols of two or three persons equipped with a radio were frequently dropped on the Finnish front to observe and report road movements. Ski troops were widely used for rear area and flank reconnaissance. The use of assault reconnaissance to seize and interrogate prisoners was a common practice on the northern front in World War II. Although aerial reconnaissance is exceptionally important in operations over snow, the Soviet Union had little success in this field against the Finns, possibly due to poor photography and interpretation techniques.

CLOTHING, SHELTER AND PERSONNEL PROBLEMS

Clothing

46. The Soviet Union issues various kinds of special clothing for cold weather fighting, the amount and type depending on the severity of the weather. For the onset of cold weather, the woollen tunic and breeches, worn beneath the military overcoat, and woollen-cotton underclothing are considered sufficient. Adjustments to changing outside temperatures are made by the "layering" principle -- garments being added or taken off as the situation requires.

47. Various items of standard Soviet issue are suitable for use in cold weather operations. They are as follows:

(a) Standard winter cap (wool) - ushanka.

(b) Knitted toque, with extra flap sewn horizontally around it from ear to ear.

(c) Mittens, three compartment type, fur or moleskin lined.

(d) Two-piece cotton padded, quilted suit consisting of jacket (single-breasted, fastening down the centre by means of tabs and buttons), and breeches of the same material, fitting tightly around the bottoms of legs. The suit fits loosely and can be worn over either regular winter uniform or the long winter underwear. It is light in weight, suitable for combat, and fairly comfortable at low temperatures.

(e) Sheepskin coat, the shuba, consisting of a leather coat with fur lining, single-breasted, with a wide overlapping at the closing which is fastened by concealed hooks.

(f) All-felt, knee-length boots, the valenki, for wear in dry-cold climates, made of thick rolled felt about one-fourth inch thick in the leg portion but thicker in the foot and sole. They are worn with as many woollen foot-wraps as needed but must remain loose-fitting as a precaution against freezing. For wet cold, a modified form of valenki is worn, having the shoe portion covered with rubber.

48. For extreme cold, maximum protection is provided by the "arctic" uniform which consists of the following:

(a) Heavy cotton quilted jacket lined with reindeer, fox, or dog fur, with a fur-lined collar.

(b) Heavy cotton quilted trousers with lining extending four inches below the trouser legs forming a tight cuff, and reaching well above the waist.

(c) Knitted wool turtleneck sweater worn underneath the jacket and trousers.

(d) Arctic overcoat, a one-piece reindeer-skin garment extending down to the ankle. Its sleeves are slitted so that they can be rolled back to expose the hands.

(e) Fur-lined mittens.

(f) Polar fox skin cap with 1½-foot flaps on each side for wrapping as a muffler.

(g) Quilted wool cap lined with imitation fur.

(h) Arctic boots, reaching to the thigh, with felt soles and heels. The shoe portion is made of leather, and the uppers are made of dog or other skins sewn together with the hair portion of one turned toward the leg and that of the other turned out. The boot has a leather strap with buckles over the instep, a leather strap just below the knee, and leather loops at the top for fastening to the belt.

(i) Socks made of sheep or dog skins, worn inside the boots.

49. The "mountain" uniform, which also may be worn in cold weather operations, is a special storm suit made of waterproof and windproof material. It consists of the following: double-breasted, hip-length, loose-fitting jacket; full-out woollen trousers, with two hip pockets. The storm suit is worn over the padded or quilted suit when protection is required for windstorms, snowstorms or low temperatures.

50. Four types of camouflage uniforms are used, as follows:

(a) White, two-piece suit consisting of trousers and jacket with hood.

(b) Mottled green coverall.

(c) Two-piece mottled suit with a hooded cape.

(d) Reversible mottled green-white suit of rubberized fabric.

51. An evaluation of the protective qualities of these special uniforms may be inferred from the fact that cases of frostbite, of which the Soviet Army has very few, are blamed on poor management and carlessness.

52. Reports have been received that the following items of clothing are generally issued to Russian crews on ships of the Northern Sea Route: goatskin, knee-length coat, fur inside, with high collar; goatskin helmet leaving only the eyes exposed; knitted cap worn inside helmet; felt knee-high boots; high, heavy woollen stockings; large, soft-soled, sheepskin slippers for wear inside boots; heavy, canvas coated pants tied at ankles; canvas padded jackets tied at wrist and neck; goatskin mittens, fur inside; knitted gloves for wear inside mittens; heavy knitted long underwear; extra sheepskin bed blanket for each man; flannel shirts and one sleeveless leather jacket, sheepskin lined.

53. It is highly unlikely that all of these items are in the possession of each man of the Northern Fleet, since most personnel of the latter are stationed weat of Novaya Zemlaya, on the Barents and White Seas, where weather is less severe.

Shelter

54. The ability of Soviet troops to make comfortable shelters with little or no special equipment was an important factor in the conduct of winter operations in the Second World War. For warmth and shelter they used tents, shields, huts, and dugouts. If lumber was not available, dens and various types of huts were built in the snow, using snow, ice, and/or frozen ground. Regulation Soviet equipment and techniques for cold weather shelters are as follows.

55. The standard Soviet winter field tent consists of two one-piece canvas tents, one inside the other. It is supported by one centre post and is fastened to the ground by tent ropes tied to metal pegs frozen into the ground. It is heated by a portable stove.

56. Soviet troops rely heavily on improvising shelter out of whatever is available. Huts of various sizes are made of wooden frames covered with branches, snow and sometimes shelter halves or tents. The following types of shelter are also known to be used:

(a) Shields of slanted "walls" made from wooden poles or trees covered with snow, branches, or tent canvas. They are of single or double type, and are heated by placing two burning logs, one above the other, on the lee side of the single type, or in the centre of the double type. These fires are reported to provide a small glow with sufficient heat for 24 hours.

(b) Round huts, constructed from wooden poles and covered by shelter halves, branches, etc. A fire is built within; smoke escapes through a hole in the upper part of the structure.

(c) Dugouts of various sizes covered with logs or unfinished lumber. Fireplaces are improvised at the ends of tunneling to the surface of the ground, to form a chimney.

(d) Snow huts of the igloo type, built from blocks of firm snow. They are heated with fuels such as kerosene or charcoal which do not require a flue.

(e) Snow dens built from lumps of firm snow, or dug in snow drifts and covered with wooden rods or skis, matting, and a layer of snow. The walls and floors are also covered with a layer of brush, matting, or straw. Reportedly, the temperature inside may be maintained at 2 to 3 degrees above freezing by the warmth of the occupants alone.

57. The Soviet Army has attempted to devise adequate drying shelters for clothing, footgear, etc., by using dugouts with two fireplaces and campfires with steeply sloped shields. The effectiveness of these improvised sheds is not known.

Personnel

58. Winter in the Soviet Union generally duplicates the conditions of military operations in cold weather. As far south as the southern Ukraine, intense cold and deep snow greatly restrict normal working and living habits. Before and after the winter season, deep impenetrable mud prolongs the period of enforced inactivity. Most of the Soviet population live in small communities far from cities, and there is a lack of good roads connecting these communities with the cities or even with one another. As a result, isolation, accompanied by inactivity and little or no recreation or entertainment, because the rule rather than the exception for life in the Soviet Union. The Soviet soldier, as an individual, thus acquires an exceptional ability to adjust to the circumscription of personal life in warfare generally, and cold weather warfare in particular.

Physical Limitations.

59. From a military point of view, the physical limitations imposed by Arctic and sub-Arctic weather are reflected in increased ration requirements, decreased ability to march and carry loads, and susceptibility to frostbite.

60. A Soviet writer (M. Belyakov) has recommended a daily ration of 5,500 calories for hard expeditionary work, and the quantity of food to be distributed as 160 grams of proteins, 240 grains of fats, and 900 grams of carbohydrates. It is likely that this daily ration, or something approaching it, has been made standard for military groups operating in similar conditions.

61. Soviet doctrine requires special attention to physical conditioning of troops for cold weather. This can only partly compensate for the rapid exhaustion caused by winter conditions, however. Precautions against frostbite are stressed by the Soviet Union and are well known to most troops. Special care of clothing, observation of fellows, and other measures are maintained by strict discipline. Occurrence of frostbite is severely punishable.

Army Equipment

62. Small Arms and Artillery. Most standard Soviet small arms and artillery weapons appear to be usable or adaptable for cold weather operations. The simplicity of Soviet small arms, particularly the sub-machine gun, contributed to their performance in cold weather during the Second World War. Soviet troops are well practised in the use of Arctic lubricants for artillery, as well as in the use of special recoil fluid. Weight of fire with lightness (which aids mobility over snow) is achieved to some extent by the use of large calibre mortars in forward artillery roles.

63. Vehicles. Soviet troops maintained a high degree of readiness of armoured vehicles in winter by applying simple methods, including digging tanks into the ground, using special tank heaters and lubricants, and diluting lubricants with gasoline. The simplicity of the Soviet armoured vehicle (which uses one type of engine for the G-34 and JS-3 tanks, and medium and heavy self-propelled guns) is useful. Torsion-bar suspensions and enclosed spring systemshave been found most suitable for winter operations and the Soviet electric and pneumatic dual starting system is useful in cold climates where the efficiency of storage batteries deteriorates with drops in temperature. Soviet trucks are mainly copies of the United States Second World War vehicles and possess no special advantages for winter mobility. A variety of sleds, ranging from individual hand models to propellor-driven motor sleds, has been used, although the propeller-driven model was a conspicuous failure, at least before the second world war. A tractor (the KT-12), which burns wood chips, is in production, and a half-track lorry which has been widely used on the Arctic coast was produced in the 1930's.

64. Railway Equipment. Standard Soviet railway equipment is generally adaptable for cold-weather operations. There is no indication that diesel equipment is operated in Arctic areas, although electric power is used on the Kirov railway across the Kol'skiy Poluostrov.

65. Ordnance Stores. Standard stores are adaptable for Arctic and sub-Arctic use and special-issue clothing is available. Certain development projects are known to have been carried on with improved ski waxes, rubber de-icers for the soles of foot-wear, double-wall canvas tents with heated floors, special cotton-padded textiles and the use of skins of sea animals in place of leather.

66. Mines. The simplicity of the Russian mine lends itself to use under winter conditions. Moving parts, which areat a minimum, have easy clearances so that they will not seize up. Mines using pressure igniters are preferred to the pull-or pin-withdrawal type of igniter. Plastic explosivesare unsuitable and do not retain their plasticity in low temperatures. Other types of explosive become more sensitive, but their strength is reduced. Safety and detonating fuzesbecome very brittle.

67. Mine Laying. In soft snow, mines are laid on a base of wood or stones so that they are crushed and not readily pressed into the snow when a load comes on them. In hard snow, there is a danger that the pressure of the enemy vehicle may be carried by a bridge of frozen snow which has formed over the mine. To obviate this, an extra pressure plate is placed just below the surface of the snow and resting on the pressure plate of the mine. During the thaw period, mines will sink into the mud unless placed on a stone base or planks. The minelaying technique varies with the depth of the snow as follows:-

(a) Snow 2" - 4" deep - Mines flush with ground
(b) Snow 4" -12" deep - On top of ground
(c) Snow 12"-24" deep - On top of a firm base not more than 12 inches deep.
(d) Snow over 24" deep - Minelaying is considered unnecessary as the snow is a sufficient enough obstacle.

If the snow has formed a frozen crust, mines should not be buried more than 4" to 6" inches deep.

68. Mine Lifting. The extraction of igniters and detonators from frozen mines is impossible and they should be destroyed in situ. The behaviour of mine detectors is only affected in so far as the cold reduces the capacity of the batteries. The theory that proven tracks are safe does not hold for frozen or thawing ground.

69. Chemical Warfare. No information is available about Soviet use of CW in the Arctic and their standard respirator is not well adapted for use in low temperatures. All CW agents, other than very volatile gases, behave differently at very low temperatures, and therefore present, a new set of problems.

70. Medical. There is little evidence to support the view that significant progress has been made in the design of special medical equipment for Arctic use.

71. Signal. The simple, functional and rugged construction of most Soviet signal equipment will enable it to work effectively in the Arctic and sub-Arctic. Tests on recent models of Soviet radios have, in fact, revealed unusually good cold-weather performance.

Naval Equipment

72. Merchant Marine. In the merchant marine field, the Soviet belief is that small vessels generally are best suited and used in the Arctic region. This limitation is dictated by the shallow waters of the Arctic Sea coast and by ice which tends to trap and crush deep draft ships under certain wind and other weather conditions. One voyage per season per ship any considerable distance into the area is believed to be the turnaround time for Arctic marine operations.

73. It is difficult to determine how much cargo can be transported over the Northern Sea Route. Despite some seasonal fluctuations it is believed that about 300,000 gross tons of shipping operate on the route. Possibly two-thirds of this amount operates in Western Arctic waters, mostly to and from Murmansk and Archangel. The remaining third enters and leaves the Arctic area through the Bering Straits in the east. Turnover on the route is believed to be higher than in the pre-war years.

74. Icebreakers. As early as 1946 the Soviet Union is known to have been experimenting with icebreaking by the use of water jets to cut ice in advance of a ship. The Soviet Union is thought to have about 120 icebreakers.

75. Guided Missiles. A few unconfirmed reports state that the Soviet Union has tested the launching of V-1 type missiles from submarines of a fleet manoeuvering in arctic water and based at Archangel. Although the reports are unconfirmed, it is likely that the Soviet Union has given serious thought to the cold weather operation of V-1 (and possibly other) missiles.

76. Underwater Weapons. There is no information on the extent of cold weather tests conducted by the Soviet Union on underwater weapons.

(a) Mines. It has been reported that moored contact mines were laid in the Murmansk-Archangel region during World War II. It is not believed that moored contact or accoustic mines would be used in locations where ice conditions exist. Therefore, the type most likely to be encountered would be the magnetic mine. However, there is no information available on which to assess the Soviet capabilities in this field.

(b) Torpedoes. The Soviet Union has undoubtedly test-fired torpedoes in Arctic areas from both above-water and submerged tubes. It is assumed that they are capable of operating above-water tubes in the temperatures encountered; submerged firing should pose no serious problem. The torpedoes themselves might be sluggish in their operation and improvements in known operational torpedoes can be expected.

(c) ASW Weapons. The only known Soviet antisubmarine weapons are conventional type ahead-thrown weapons and conventional depth charges.

77. Surface Weapons. The Soviet Navy operates in Arctic waters as normal routine and can be expected to have acquired extensive knowledge of the ordnance problems created by extremely cold weather conditions. It is assumed that cold weather equipment has been incorporated in most Soviet Fleet units, as interchangeability of vessels between fleets is necessary.

78. The over-all capabilities of Soviet naval surface weapons for Arctic warfare are better than those of current Canadian weapons, as the Soviet Union has operated extensively in Arctic areas. [illegible] Soviet personnel are thoroughly indoctrinated in Arctic operations techniques. It is believed that Soviet weapons are better protected and easier to maintain in operating condition in the Arctic than those of any other seapower.

79. Naval Communications Equipment. Soviet naval communications equipment is very simple, but normal performance is comparable with that of Canadian equipment. The equipment so far known is less rugged than ours and is far more sensitive to the effects of wide temperature variations, high humidity, shock, vibration, and salt spray than comparable U.S. equipments.

80. The local oscillator in the Soviet Navy's PURGA-45 receiver provides temperature stability of 0.035 per cent/degree Centigrade as compared to the U.S. Navy RBB/RBC stabilities of 0.001 to 0.003 per cent/degree Centigrade. To provide calibration needed due to excessive temperature changes, the Soviet set is provided with a simple built-in frequency meter.

81. There is some indication of improved component design. The best example is the KV-M receiver, a copy of the Hammerlund Super-Pro. Although no particular or original cold weather protection is apparent, general improvement of component design over earlier sets is evident.

82. For many years the Soviet Union has made wide use of low frequencies. This type of communication is more reliable in the Arctic, where high frequencies are subject to occasional failure.

83. Electronics. There is no recent information indicating the Soviet electronic approach to the Arctic navigation problem. Continued interest in medium frequency direction finding is evidenced by their standard use of such gear on all their fleet units. Intelligence reports have indicated Soviet interest in a navigation aid similar to low-id frequency LORAN. [illegible].

84. It is considered very likely that the Soviet Union is in a position to utilize our own navigation aids. Outside of that and the possible long-range hyperbolic aid discussed above, reliance upon celestial aid and direction-finding is most probable. There is no evidence of naval electronics work, other than that mentioned above, with cold weather implications. It is believed that the developments most worthy of watching for cold weather implications are the very-low frequencies, possibly for communications and/or navigation.

85. General Design Characteristics. There is no detectable difference in design or equipment between naval vessels stationed in the Arctic and their sister ships serving in other ocean frontier zones of the Soviet Union.

86. Research and planning to improve ice navigation and to increase seaborne trade in the Arctic apparently are still in progress. Some merchant vessels acquired recently have been provided with additional strengthening - in particular a large number of fishing trawlers, which are potential escorts, minesweepers and coastal cargo vessels. Larger and more powerful icebreakers are on order and perhaps one super-icebreaker is actually under construction in the Soviet Union. In additional, many scientific expeditions have been sent into the Arctic: 400 investigations were reported to have been conducted between 1947 and 1951.

87. Naval Munitions. Soviet powder train time fuzes, such as have been encountered in Korea may be better adapted for cold weather operations than mechanical time fuzes. Likewise, VT fuzes are subject to premature bursts in the Arctic and sub-Arctic. Gun propellants are largely unaffected by cold although initial velocities and resultant ranges are decreased by cold weather. Primers and detonators have functioned normally in past Arctic tests.

Air Force Equipment

88. In general, Soviet air force equipment is rough and crude compared to that of Western manufacture. On the whole, this cruder and more rugged equipment is more workable under Arctic conditions than are its Western counterparts.

89. Aircraft Equipment and Weapons. The turbojet fighter or interceptor appears to be the type of aircraft most readily adaptable to Arctic operation. This type of engine is simple and can be easily started when cold: consistently good starts have been obtained at temperatures as low as -56° F. It can be maintained in a permanent state of readiness with considerably less ground equipment than is necessary for conventional engines. Since the Soviet Union has placed emphasis on jet aircraft development and production, it is logical that it would employ aircraft of this type in future Arctic and sub-Arctic operations.

90. Among special problems on which no information is immediately available with regard to Soviet solutions are: the freezing of cockpit instruments; the stiffness of operation of the moving parts of automatic weapons and other material due to cold lubricants; the improper functioning of equipment and the leakage of fluids due to differences in the contraction of materials; the failure of bomb fuzes, instruments, weapons, and equipment due to the freezing of condensation, and the distortion of moving parts having close tolerances, [illegible].

91. Communications. The difficulty of constructing and maintaining land lines for communications has forced the Soviet Union to rely upon radio to a large extent. In 1946, approximately 270 radio stations of various types were listed as located north of 60 degrees north latitude in Russia. This does not include amateur stations that have been reported as far north as Wrangel Island and Novaya Zemlya. Reports indicate that the Soviet Union has instituted a chain of unattended stations that will transmit weather information. During the summer of 1945, United States aircraft ferrying aircraft to Siberia from Alaska noted that homing beacons every 600 miles constituted the main form of navigational aid in that area.

92. Radar. The Soviet Union received a large quantity of radar equipment from the United States and the United Kingdom during World War II. In addition, a great deal of German equipment was captured or otherwise acquired. Since then, the Soviet Union has benefitted from published US work and from German scientists and technicians and has succeeded in modernizing equipment. It is known to have radar installations in the Murmansk, Chukotski, and Kamchatka areas. The Soviet Union has the capability of installing networks of radar early-warning stations in Arctic areas, but may have difficulty in obtaining the trained technicians required to operate these stations.

93. General Design Characteristics. Soviet concentration on simplicity in all items of materiel and equipment makes for standardization and facilitates production and maintenance by semiskilled labor, the training of personnel, and logistics. Although some of the materiel and equipment used in the Russo-Finnish War and in the Second World War is now obsolescent, information on Soviet research, development, and production for its replacement is far from complete.

94. However, as a result of intelligence acquired during the Korean campaign, it is now considered that Soviet technical advances have been more rapid in a number of fields than had previously been expected. Improved engine technology, as demonstrated by the modified Soviet version of the Nene jet engine, is one example. Advances have also been made in the electronics field.

95. Soviet radio-communications equipment adheres to accepted foreign design and construction practices. However, it does not follow that late designs of Soviet electronic equipment are inferior to United States types, for Soviet-made equipment captured in the Korean campaign conclusively demonstrates that the Soviet electronics industry made great strides in the period from 1949 to 1951. Formerly, Soviet receivers contained German, American, and Soviet parts; recent receivers have only Soviet components of good design. Available information on the Soviet electronics industry indicates that it is producing communications equipment that is well engineered, comparatively cheap, easy to maintain, and which meets Soviet operational needs.

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TRANSPORTATION IN ARCTIC AND SUB-ARCTIC OPERATIONS

96. Since snow, mud, ice and cold militate against ease and swiftness of movement in the Arctic and sub-Arctic, an exceptional strain is placed upon the exceedingly limited roads and railways of the region.

97. Railways. Although difficulties are great, it is possible to construct railways in the Far North with special techniques. Maintenance is excessive, and constant surveillance must be maintained over every mile of track so that repairs can be made before rolling stock is damaged. Railways nevertheless are more suitable for year-round transportation than are highways or cross-country movement. During the fighting on the Kola Peninsula in the Second World War, the fact that the Soviet Union were able to hold the Murmansk railway and keep it open for traffic through most of the war was an important element in their success. Three railways serve the northern areas of European Russia. The Leningrad-Murmansk railway has a branch just south of Kandalasksha that connects with Kemi in Finland and with the Scandinavian Peninsula. A branch from Belomorsk, along the south side of the White Sea, connects with the Moscow-Arkhangelsk line. Both the Kemi and Belomorsk branches were constructed during the war. The latter railroad also has a branch from Konosha to Kotlas, connecting with the Kotlas-Vorkuta line (the Pechora railway) and a branch from Volgada, connecting Leningrad. The Kotlas-Vorkuta railway has been extended to the Ob River.

98. Roads. As in the case of railways, firm road beds are necessary, making the scarcity of rock and gravel in some areas an important problem. In sub-Arctic regions where timber is available, corduroy roads are built. During the Second World War, corduroy roads over mud and swamp were the most important static improvision of the Russian campaigns.

99. In winter, roads require special maintenance. Snow plows must be kept constantly at hand. Rest stations with warm quarters must be established at short distances along the roads for drivers and maintenance personnel in case a blizzard strikes or motorized equipment becomes stalled. In wartime these are invaluable for use by troop units on the march.

100. Winter roads, particularly if they are improvised for military purposes, may not have a definite course. Heavy snowfalls and drifts may make regular routes impassable, especially where defiles or roadcuts are filled with snow. In the barrens, the best routes are over windswept heights, avoiding populated localities to reduce the incidence of snowdrifts. Within the tree line, frozen water courses normally offer the best route. Markers are an adjunct to winter roads, and after a blizzard they may have to be moved to a new course if it is better cleared than the old route.

101. In summertime, roads are severly affected by the thawing of soil moisture and snow cover. The Germans found that even the few Soviet hard-surfaced roads in the North sometimes were impassable during a thaw. Use of roads in the mud period, even though passable to a limited extent, was found to be impractical except during night frosts and early in the season. Continued use turned muddy roads into impassable mires, and the ruts and ridges formed by passing vehicles became cement-hard obstacles after the road dried.

102. Marshal Timoshenko is reputed to have told Stalin at a military conference in 1941, "The muddy season, even more than the winter, will help to destroy the Germans." Judging from German war reports, this prophecy was well reasoned. All movement was paralyzed, at least during the worst part of the mud season, and special "mud period supply dumps" had to be established. Such supply as could be maintained at all under mud conditions relied on horse-drawn carts and other slow, tedious means.

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103. During the Finnish campaigns, vast trackless wastes were completely ignored by both sides in summer and winter. There were five key roads in this region, and the broad spaces between them remained virtually untouched by the war. Road networks in the Soviet Union are relatively primitive and undeveloped, expecially in the Soviet Arctic and sub-Arctic. Among the exceptions are the two all-weather highways in eastern Siberia, which run from Magadan inland to the upper Kolyma river and from Never on the Trans-Siberian railroad to Yakutsk. Many existing roads are ordinary dirt paths, entirely impassable by wheeled vehicles during long periods of the year because of rain or snow. Dust could also be troublesome. Long-distance movement of passengers and freight by highway is negligible anywhere in the Soviet Union and virtually nonexistent in the Soviet Arctic. Some use is made of caterpillar trains and air sledges in the Soviet Far North.

104. Merchant Shipping. Lateral transport of supplies to bases or operating units along the Siberian coast may be accomplished by the use of the "Northern Sea Route" which connects European Russia with eastern Siberia via the Arctic waters. This route, with western anchors at Archangel and Murmansk and eastern terminus at Vladivostok, is about 7,000 miles long. The operations of the Northern Sea Route Administration are creating a reserve of personnel indoctrinated in the problems of Arctic flying and movement by sea in Arctic waters.

105. As related to merchant shipping, the Arctic navigation season (for complete transits) usually extends from mid-July through September. The east (Bering Sea) and west (North Atlantic Ocean) approaches to the Arctic Sea are open longer. This means that vessels could stage in those approaches before the Arctic season and increase the total time available; for example, ships can start moving from the Baltic in April and May in time to reach the Arctic to coincide with the arrival of warm weather, thus extending the season a month or two. However, even in August, some ice is found in the form of bergs and floes (packs) which necessitate assistance from icebreakers, and fog is an important hazard. The same limitations apply in general to the transit of naval vessels via the Northern Sea Route. Observations of the state of the ice from aircraft before and during the navigational season is an essential condition of successful shipping operations. Bases for air reconnaissance have been established along the entire route and in addition large Soviet icebreakers carry one or two aircraft.

106. There is no known fixed operational pattern for merchant shipping in the Arctic. Vessels can proceed singly or in groups. They follow courses dictated by depth of water and ice conditions, usually following a route that may be considered as coastal. Local deviations are made, not only as imposed by these factors, but as recommended by aerial reconnaissance of ice-free areas ahead. Not many vessels make complete transits of the Arctic Sea route. The majority operate from either end (Murmansk-Archangel in the West and Vladivostok in the East) to some point along the coast and then return to the starting point. The main Arctic ports served are those at the mouths of the great Siberian rivers -- the Pechora, Ob, Yenisei, Khatange, Lena, Kolyma and Anadyr. Icebreakers are essential to the operations. However, rather than tie up icebreakers in continuous escorting, they are disposed along the route at bases provided with radio equipment, and they are dispatched as required to escort or extricate vessels caught in pack ice.

107. Beginning in 1931, ships have succeeded in completing the through passage from Archangel or Murmansk to the Bering Sea, or the reverse journey, during each season in periods varying from six to twelve weeks. The fastest trip was made in 1940 by the German auxiliary cruiser "Komet" (3,300 tons), with Soviet icebreaker assistance and under particularly favourable ice conditions. Passage was made from Novaya Zemlya to the Bering Strait in about 20 days.

Inland Waterways

108. Inland waterways provide the only surface means of transportation between the Arctic areas of the Siberian coast and the industrial sections to the south and west. Flowing north from the southern borders of Siberia, the Ob, Irtysh, Yenisei, and Lena Rivers with their tributaries provide the link from the Trans-Siberian Railroad to the Arctic Seas. The Soviets have spent considerable effort in developing these water routes and adequate loading facilities are available at the rail junction points of Omsk, Novosibirsk, Krasnoyarsk, Irkutsk and Ust Kut. Limiting the use of these routes is the severe cold which restricts navigation to the period of May-June to October-November. While it is impossible to estimate the freight capacity of these rivers, it is safe to say that it would probably require an entire summer to build up a base for a major Arctic operation assuming a river were the only means of transport. However, it would be possible to maintain an established naval or air base without too much drain on normal traffic.

109. Farther to the west, connecting the Leningrad-Moscow industrial area and the Baltic Sea with the White Sea, is the Baltic-White Sea Canal. Its strategic importance lies in its value as a transfer route to the Arctic for ships of the Baltic Fleet and (after the completion of the Volga-Don Canal in 1952) the Black Sea Fleet. Ships up to destroyer size can transit the Baltic-White Sea Canal, a trip of 4 to 5 days, during the months of May through October. Thus, a large-scale northern operation could be organized during the summer months without detection.

Shipyards

110. Few shipyards are located in the Arctic and sub-Arctic area. It is known that there are shipyards at Murmansk, Molotovsk, about 20 miles west of Archangel, and the Krasnaya Kuzmitsa Yard immediately north of the same city. These yards are reported to have heating sheds for personnel assigned to outside work during the winter months. Although special clothing is supposedly furnished their workers, it is believed to be rather inadequate. Welding is done indoors during cold weather. Molotovsk has covered building ways providing for temperatures above the minimum allowed for welding -- even when outside temperatures drop to -40° and -50°F. All major shops at Molotovsk are connected by railroad. Steam and water lines are protected in heated underground tunnels. Icebreakers stationed at this yard keep access lanes open during the winter months. It is believed that new construction is so planned that no launchings occur during the winter -- although they could probably be carried out with special preparations.

111. Underwater repairs to ships have been accomplished in the Arctic without the use of conventional drydocks. To be able to repair plating below the waterline, the ship is purposely left to be frozen in the ice. By cutting top sections of the ice next to ship's hull, the thinner areas of ice refreeze from the underside and build up successive layers of bouyant ice under the ship. Repetition of this process physically lifts up the hull after which a working space can be cleared adjacent to the hull area to be repaired. According to reports, even the keel can be reached by this method.

112. Requirements of fuel and lubricants for the Northern Fleet operating forces under wartime conditions will be about 981,000 long tons for one year. There are facilities at Murmansk and Archangel capable of handling these fuel requirements, assuming rail and port installations are not damaged.

113. Naval Facilities. Except for the Far East area, and Soviet Arctic naval operation will have to be staged from the European Arctic coasts and will be dependent upon the only ports of significant size, Archangel and Murmansk. Archangel has a maximum handling capacity of 28-30,000 long tons per 20 hour day (or about 15,000 actual) and Murmansk has a maximum capacity of 7-8,000 long tons or in practice about 4-5,000. It is estimated that railroads in and out of the ports could supply the area as rapidly as ships could be loaded and moved from the port. None of the other transport links from the coast to the industrial areas will contribute significantly. In the Far East area, there are several small capacity ports including Petropavlovsk and Provideniya through which Arctic naval operations could be staged during the navigable period of the year.

114. Civil Air Routes. The Soviet Arctic is serviced from Murmansk to Uelen (on Bering Strait) by a net of airlines and a system of airports along the Arctic coast and inland, principally along the navigable rivers. Both civil and military air transports operate in the Arctic. Scheduled flying is hampered by weather, lack of navigational aids, absence of emergency fields between widely separated stops, and inadequate vacilities at the airports. Since the last war, there have been indications of a fairly extensive Soviet effort to improve airfield and navigation facilities in Arctic areas, although again the results achieved are not known in any detail.

115. Air Facilities. Throughout the Soviet Arctic, there are suitable airfield sites. In winter, the many frozen lakes in Arctic and sub-Arctic regions afford an almost unlimited number of usable airfield sites. In summer, many of these lakes could be used for seaplane operations. Since airfield locations in this area are determined by economics rather than topography, and since the economic development of the Soviet Arctic is concentrated along the great Siberian rivers, it is anticipated that airfield development, both commercial and military, will be confined to these arteries of transportation and along the coast. An exception is the region in Northeast Siberia which can be supplied by the Magadan highway.

116. Practically all of the land north of 60° presents serious obstacles to airfield construction. Most of it has a subsoil that is permanently frozen to varying depths and undergoes varying degrees of thaw in summer. Nevertheless, the Soviet Union has found ways to cope with the permafrost, and much of the material required to construct simple airfields is either locally available or can be transported down the Siberian rivers to the sites. The raw materials for cement and asphalt surfaces are available near a few sites, notably at Ukhta and Yakutsk.

117. In winter, aircraft can land almost anywhere on the ice and snow, whether equipped with wheels or skis, or not. Snow removal from airstrips is not always necessary. It is known that the Soviet Union has used snow rollers with good results. Temporary bases can therefore be established quite easily in advanced areas. In summer, conditions are quiet different, there being practically no landing areas except at permanent or semi-permanent bases. It is known that the Soviet Union has been able to use float-planes in summer and ski-planes in winter in the Arctic.

BY HAND

SECRET

ALL CORRESPONDENCE TO BE ADDRESSED:—
THE COMMISSIONER,
R. C. M. POLICE,
OTTAWA

IN REPLY PLEASE QUOTE

ROYAL CANADIAN MOUNTED POLICE
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OTTAWA, CANADA

FILE No. G 355-51

Your file No. CSC 7-17 (JIC)

23 Oct 52.

JIS
Mr. Trotman
to see

SEEN BY
J.H. TROTMAN

S E C R E T

Soviet Technical and Tactical Capabilities for the Conduct of Military Operations in the Arctic and Sub-Arctic

The Joint Intelligence Staff paper on the above subject dated 23 Sep 52 has been examined by Insp. H.A. Larsen, the Officer Commanding "G" Division. As you may know, Insp. Larsen is an officer who has had a great number of years of experience in the Arctic, both on land and at sea, and he has offered the following comments on the JIS study:

Page 9, para 19. Soviet Light Sled.

There do not seem to be any outstanding features about the Soviet light sled. Throughout our North country we have several types in use which would meet the requirements, frame types, basket types and toboggan.

The Indians of Great Whale River, a very nomadic band years ago, travelled long distances without the aid of dogs. Their sleds or toboggans were hauled by man power, were constructed of wood grown locally, and were light of construction and very durable.

Many persons who use toboggans or light-type sleds with a wood surface in contact with the snow now soak the runners in light diesel oil. When the toboggans are used the surface becomes polished and there is less adherence of overflow and slush, dog excreta, etc. and it provides a good running surface, its qualities being superior to wax, which has tendency to wear off. Another method used is covering the surface with candle wax or tallow and burning same into the wood.

Page 10, para 21. Movements in Winter.

"For the prevention of frostbite the extremities of the body are rubbed with grease."

..... 2

Major J.E. Beswick,
Secretary,
Joint Intelligence Committee,
4801 "A" Bldg.,
OTTAWA, Ontario.

68

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This is an unheard of practice in the Canadian Arctic. Even the Eskimos are very careful to keep grease from contact with their bodies, otherwise they would quickly freeze. During low temperatures when one touches grease, the part in contact freezes rapidly.

Perhaps the Soviets have prepared some medication which is useful in preventing frostbite and the observer mistook same for grease.

Page 20, para 47. Clothing.

Canadian-type clothing used by armed forces personnel is mostly fastened with zippers. It is noted that the Soviets use tabs, buttons, hooks, which if of large enough size are far better method of securing clothing, especially when the wearer has to spend days in the open and exposed to the climate.

Zippers become frosted and difficult to attach even on moderate temperatures.

Page 24, para 61. Medicinal Herbs.

Coniferous needles and Arctic and Sub-Arctic plant life is known and has been for many years by natives, prospectors and trappers in the Canadian North.

The last growth at the top of spruce was used as an anti-scorbutic as was also the fire weed, wild carrot and onion and other roots and plants.

Page 27, para 71. Merchant Marine.

This belief was also held by many in regard to our northern waters. The smaller-type vessels of moderate draft are better able to avoid many of the dangers of ice and afford themselves the protection of the Coastal routes, bends and channels not passable to vessels of deep draft.

2. The Joint Intelligence Staff may also wish to refer to a report dated February 16, 1941, by Mr. Larsen, and forwarded with a letter dated April 16, 1941, to Capt. E.S. Brand as Director of Naval Intelligence. This letter and report were forwarded under our file caption 40/D 1170-Q-20. In this latter report Mr. Larsen presented a good deal of information about Russian capabilities in the Arctic area.

Mark McClung
for (K.W.N. Hall), Insp.,
for Officer i/c Special Branch.

CSC 7-27-0-1 (JIC)

SECRET

24 Jul 52

Chairman,
Canadian Joint Staff,
WASHINGTON, D.C.

US JIC Paper JIC 589/1

1. Copies of a US JIC paper entitled "Estimate of Soviet Capabilities for the Conduct of Military Operations in Arctic and Sub-Arctic Environments" (JIC 589/1) were received with your memorandum CJS 264-7 of 17 Jan 52. This paper was received with much interest and has been studied by the various directorates and agencies concerned with intelligence and cold weather operations.

2. It is now understood that the US JIC is producing a revised version of this paper, or another paper along similar lines. It would be appreciated if an informal approach could be made to the Secretary, US JIC with a view to obtaining more information on this and, if possible, copies of any new paper.

(H.S. Rayner)
Commodore, RCN,
for Chairman, Chiefs of Staff.

JEB/5459/fp

MEMORANDUM

To : [redacted] (Mr Thomas).

Ref. para 58 and item 16 of the progress report for May 52. May the next progress report please contain a note on what has been completed to date on the Cdn papers.

[redacted]

JIC

6 Jun 52

ANSWER

To : Sec, JIC

I will put something in the progress report as you suggest - but, for your information in the meantime, we would point out that:

(a) a certain number of comments are still promised from Directorates.

(b) we have comments on about one in forty of the paras in the paper - which means that the remainder has merely to be re-written to make it look different

(c) this is a large, long and low-priority job (quite apart from being unnecessary)

(d) we are busy.

JT 11 Jun 52

000265

1500-Pads of 100-5-48 (1122)
C. A. F. A. 207
H.Q. 224-21-A-207

7-17.

JOINT INTELLIGENCE COMMITTEE

Extract from the minutes of the 310th meeting held on 9 Apr 52.

VIII. SOVIET CAPABILITIES FOR THE CONDUCT OF OPERATIONS IN ARCTIC AND SUB-ARCTIC ENVIRONMENTS (SECRET)

23. The Committee, at the 303rd meeting, had directed the JIS to examine the US JIC paper (JIC 589/1) which deals with Soviet capabilities for the conduct of operations in Arctic and Sub-Arctic environments. The JIS had recommended that the information be made available to other interested staffs and had asked the JIC to decide on the manner in which the information should be made available. There was some difference of opinion on whether a Canadian paper should be prepared or whether permission to use the US paper should be sought.

(CSC 7-17 (JIC) of 3 Apr 52)

24. It was agreed, after discussion, that despite the length of time that it will take, a Canadian paper on this subject should be prepared, and that the JIS should therefore commence the project.

58

CSC 7-17 (JIC)

SECRET

JOINT INTELLIGENCE COMMITTEE

8 Apr 52

G. de T. Glazebrook, Esq.,
Dept. of External Affairs.

Soviet Capabilities for the Conduct of Operations in Arctic and Sub-Arctic Environments

1. You will have noted that I have had to include on the agenda for the meeting on 9 Apr the matter of making available the information in the US paper JIC 589/1. This results from the divergence of view, which I could not reconcile by memorandum, on whether a Canadian paper should be produced or whether we should ask the US JIC for permission to use their paper.

2. As there are disadvantages to both courses I would like to suggest as a compromise:

(a) That we ask the US JIC for permission to reproduce portions of their paper. (As the paper contains more than Canadian readers need we could omit certain parts and could condense others. Furthermore, I feel that it would be an imposition to ask the US JIC to provide us with any large number of additional copies.)

(b) That in the reproduction of the US paper the Canadian comment be inserted in the appropriate location, suitably headed; e.g., Canadian View or Canadian Comment.

(c) The resultant document could be sent out under some general note to the effect that the paper is based upon and reproduces in part a study undertaken by the US JIC.

3. At the meeting on Wednesday you may also wish to raise the desirability of passing to the US JIC some Canadian comments on the study.

(J.E. Beswick)
Major,
Secretary.

JEB/5459/fp

CANADA

IN REPLY PLEASE QUOTE
No. CSC 7-17 (JIC)

Department of National Defence

SECRET

CHIEFS OF STAFF COMMITTEE

JOINT INTELLIGENCE COMMITTEE

ADDRESS REPLY TO.
SECRETARY
CHIEFS OF STAFF COMMITTEE.
OTTAWA.

3 Apr 52

MEMORANDUM FOR THE JIC:

Soviet Capabilities for the Conduct of Operations in Arctic and Sub-Arctic Environments

1. In memorandum CSC 7-17 (JIC) of 27 Mar members of the JIC were asked to concur in a method of making the contents of the paper US JIC 589/1 available to other interested staffs.

2. As there is some divergence of view on the way in which the information in the US paper should be made available, the subject will be included on the agenda of the next regular meeting for the necessary decision and direction for the JIS.

(J.E. Beswick)
Major,
Secretary.

JEB/5459/fp

38

IN REPLY PLEASE QUOTE

No. HQTS 9047-34/342
(DMI)

CANADA

Department of National Defence
Army

2 April 19 52

Secretary,
JIC

Soviet Capabilities for the Conduct of Operations in Arctic and Subarctic Environments

1. Reference is made to your CSC 7-17 (JIC) dated 27 Mar 52 and the attached report prepared by the JIS on the marginally-noted paper.

2. DMI considers that the information in this paper should be made available to Canadian Army Training, Operations, Planning, Research and Development Staffs. It is recommended that an attempt be made to obtain further copies of this paper from the US and that a brief precis of Canadian views be attached to the paper before distribution to interested agencies. It is envisaged that such a precis would reflect Canadian views where our opinions on major issues and points of real significance differ with those expressed in the paper.

3. While the information might be arranged in a more logical manner and the format somewhat improved, DMI is not in favour of the JIS attempting to rewrite the paper. The bulk of the information in the paper is valid and will be useful to Training, Technical and Development Staffs. It is considered that it would take an interminable time to complete a rewrite of the paper and cause an unnecessary delay in the dissemination of valuable information.

(N.S. Cuthbert)
Colonel
Director of Military Intelligence

CSC/JS
APR 3 2 28 PM '52
7-27-0-1

C.A.F.A. 239
150M-11-48(1670)
H.Q. 224-21-A-239

ALL CORRESPONDENCE TO BE ADDRESSED:-
THE COMMISSIONER,
R. C. POLICE,
OTTAWA

BY HAND

ROYAL CANADIAN MOUNTED POLICE
HEADQUARTERS

SECRET

IN REPLY PLEASE QUOTE

FILE NO. G 355-51

OTTAWA,
CANADA

Your file: CSC 7-17 (JIC)

March 28, 1952.

SECRET

Re: Soviet Capabilities for the Conduct of Operations in Arctic and Sub-Arctic Environments

In reply to the request by JIS for guidance on the disposition to be made of US JIC 589/1, I wish to say that I favour making the information available to the interested staffs in the form recommended in paragraph 5(b) of the report from JIS, attached to your memorandum dated 27 Mar 52.

Mark McClellan
for (Geo. B. McClellan), Supt.,
Officer i/c Special Branch.

Major J.E. Beswick,
Secretary,
Joint Intelligence Committee,
4801 "A" Bldg.,
Ottawa, Ontario.

CSC/JS
MAR 29 11 23 A '52
7-17-8-1

CANADA

IN REPLY PLEASE QUOTE
No. CSC 7-17 (JIC)

Department of National Defence

SECRET

CHIEFS OF STAFF COMMITTEE
JOINT INTELLIGENCE COMMITTEE

ADDRESS REPLY TO.
SECRETARY
CHIEFS OF STAFF COMMITTEE,
OTTAWA.

27 Mar 52

MEMORANDUM FOR THE JIC:

Soviet Capabilities for the Conduct of Operations in Arctic and Sub-Arctic Environments

1. Attached is a report from the JIS on the progress made to date in the study of the US JIC "Estimate of Soviet Capabilities for the Conduct of Operations in Arctic and Sub-Arctic Environments" (US JIC 589/1). It will be noted that in para. 6 the JIS asks for guidance.

2. In the light of JIC discussions on the US paper and as the JIC decided at the 303rd meeting that information of the type contained in US JIC 589/1 should be made available to other interested staffs, it is thought that the JIC will wish the JIS to proceed with the production of a Canadian version.

3. May I please receive by 1200 hours, 1 Apr, your concurrence in this in order that the JIS may be instructed to proceed with the project.

(J.E. Beswick)
Major,
Secretary.

Enc.

JEB/5459/fp

SECRET

MEMORANDUM FOR THE JIC

Soviet Capabilities in the Arctic
and Sub-Arctic - US JIC 589/1

1. In accordance with the instructions contained in Item VIII of the minutes of the 303rd meeting of the JIC, the Joint Intelligence Staff has examined the above-noted paper, and has obtained comments upon its content and usefulness from Directorates.

2. The majority opinion amongst Directorates appears to be that this paper (in some form) would be of value to training, operations, plans and research and development staffs of the three services and of DRB, and that therefore arrangements should be made to disseminate the information to them.

3. Directorates appear to be in general agreement with the content of the paper although some important comments have been made. For example:

(a) it is pointed out that the paper deals only with technical and tactical capabilities;

(b) it is suggested that the information could be arranged more logically and the format somewhat improved;

(c) it is suggested that the paper should examine both offensive and defensive capabilities, and should survey in more detail the evidence on the presence of Soviet forces in the sub-arctic.

4. In addition, Directorates have supplied, or shown their willingness to supply, detailed comments on the more technical aspects of the subject.

5. Assuming that the JIC agrees that the paper should be circulated in some form to interested staffs, there would appear to be two ways in which it can be brought into line with Canadian views:

(a) further copies of the paper can be obtained from the United States, together with the necessary authority to circulate, and cover sheets attached to each copy, stating Canadian opinions on certain points;

(b) the JIS can be instructed to re-write the paper with a revised format, and incorporating Canadian views. In view of the specialized and technical nature of the paper, the JIS would need at least the advice, and probably the active assistance, of experts from the services, DRB and JIB.

6. It is therefore for JIC decision:

(a) whether the information contained in the paper should be made available in some form to interested staffs,

(b) if so, which of the methods outlined in para. 5 is to be adopted.

24 March, 1952 Joint Intelligence Staff.

7-27-2

JOINT INTELLIGENCE COMMITTEE

Extract from the minutes of the 303rd meeting held on 30 Jan 52.

VIII. ESTIMATE OF SOVIET CAPABILITIES FOR THE CONDUCT OF MILITARY OPERATIONS IN ARCTIC AND SUBARCTIC ENVIRONMENTS (SECRET)

16. The Committee had received copies of a US JIC paper entitled "Estimate of Soviet Capabilities for the Conduct of Military Operations in Arctic and Subarctic Environments" (US JIC 589/1). It had been pointed out that the contents of this paper would be of great value to the staffs dealing with the research and development of Arctic doctrine and equipment.

(CSC 7-17 (JIC) of 24 Jan 52)

17. It was agreed, after discussion, that:

(a) the US paper contains useful information of the type that should be made available to Canadian training, operations, planning, and research and development staffs; and

(b) the JIS should study the US paper and prepare a report indicating points of disagreement and recommended additions and/or deletions.

CANADA

IN REPLY PLEASE QUOTE
No. CSC 7-17 (JIC)

Department of National Defence

SECRET

CHIEFS OF STAFF COMMITTEE

JOINT INTELLIGENCE COMMITTEE

ADDRESS REPLY TO
SECRETARY
CHIEFS OF STAFF COMMITTEE,
OTTAWA.

24 Jan 52

MEMORANDUM FOR THE JIC:

US JIC Paper JIC 589/1

1. A copy of US JIC 589/1, "Estimate of Soviet Capabilities for the Conduct of Military Operations in Arctic and Subarctic Environments", was passed to each member of the JIC on 23 Jan. DSI and JIB have pointed out that the contents of this paper would be of great value to training, operations, plans, and research and development staffs.

2. This subject will be placed on the agenda of the next regular meeting of the JIC in order that the Committee can consider what action should be taken to make the contents of the US paper available to other interested Canadian agencies.

(J.E. Beswick)
Major,
Secretary.

JEB/5459/fp

CANADA

IN REPLY PLEASE QUOTE
No. CSC 7-17 (JIC)

Department of National Defence

SECRET

CHIEFS OF STAFF COMMITTEE

JOINT INTELLIGENCE COMMITTEE

ADDRESS REPLY TO:
SECRETARY
CHIEFS OF STAFF COMMITTEE,
OTTAWA.

23 Jan 52

G. de T. Glazebrook, Esq., #40
Dept. of External Affairs.
DMI #41
DAI #42
DNI #43
DSI #44
RCMP #45
JIB #46
#47 - JIB for return
File Folder — #48 - Spindler

US JIC Paper JIC 589/1

1. Enclosed is a copy of JIC 589/1 dated 8 Jan 52, entitled "Estimate of Soviet Capabilities for the Conduct of Military Operations in Arctic and Subarctic Environments", which has been received from the US JIC through CJS, Washington. The paper incorporates the revised pages which are noted in the decision on JIC 589/1 dated 21 Dec 51 (see second page).

2. The recommendations contained in para. 2 of the enclosure to JIC 589/1 were approved by the Joint Chiefs of Staff on 9 Jan 52.

(J.E. Beswick)
Major,
Secretary.

Enc.

JEB/5459/fp

95A

SECRET

IN REPLY PLEASE QUOTE

Department of National Defence

No. CJS 264-7

CANADA

CANADIAN JOINT STAFF

1700 MASSACHUSETTS AVE., N.W.
WASHINGTON 6, D.C.

17 Jan 52

Secretary
Chiefs of Staff Committee
Room 4444 "A" Building
Department of National Defence
Ottawa, Ontario

Estimate of Soviet Capabilities for the Conduct of
Military Operations in Arctic and Subarctic Environments

1 Enclosed for the information of the Canadian Joint Intelligence Committee, from the U.S. Joint Intelligence Committee, are nine (9) copies of JIC-589/1 dated 8 Jan 52 entitled "Estimate of Soviet Capabilities for the Conduct of Military Operations in Arctic and Subarctic Environments". The recommendations in para 2 of the Enclosure to JIC-589/1 were approved by the Joint Chiefs of Staff on 9 Jan 52.

2 One copy of this paper has been retained at this office.

(Hugh Campbell)
Air Vice Marshal
Chairman
Canadian Joint Staff

att

CSC/JS
JAN 21 12 08 PM '52
REFERRED TO Sec'd/C.
7-12
REPLIED TO J.I.C.

SECRET

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