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**ANNEX 1**

# Programme of Antarctic Navigation Course (NAVANTAR)

The programme comprises different disciplines to be used in the Antarctic, grouped into 7 extensive modules, namely: Antarctic Environment, Ecology, Marine Pollution, Foreign Affairs and Antarctic Legislation, Navigation and Maritime Security, Recent Nautical and Commanding Experience, Survival.

Helpful collaboration has been offered by specialists from the Ministry of Foreign Affairs, International Trade and Cult, Public Antarctic Bureau, Argentine Antarctic Institute, the Antarctic Commando unit, the Overseas Captains’ Center, the Public Naval School, the Armed Forces Operational Commando unit, the Operations Bureau, Policies and Planning, the Bureau of Health and Social Work, the Atlantic Naval Commando unit, the Naval Hydrography Service, the Under-secretariat of Maritime Affairs, Hull Management, Electricity and Naval Machinery, the Head Office of the P.R. department which reports to the Naval General Secretariat, the Bureau of the Naval War School, the 2nd Air-sea based Commando unit, the Environmental Security Service, the Army’s General Inspectorate, the ARA Robinson corvette Commando unit, the Naval Education Bureau, the ARA “PARKER” corvette Commando unit, the Joined Transportation Commando unit and the Head Office of Mar del Plata’s Naval Base

# ANTARCTIC ENVIRONMENT

* Introduction to natural environment
* General knowledge of the Antarctic and its natural surroundings.
* Distinctive geographic factors and physical phenomena present in the continent, in the isles and in the adjacent seas, and their relation with the operations.

## Meteorology and Climatology

* Climates in the regions of South America, the Antarctic peninsula and Bellingshausen and Weddell seas.
* Oceanographic factors and their interaction with the atmosphere.
* General Circulation
* Mean trajectories of depressions, cyclogenetic zones, migrating anticyclones and climatology of blockade situations.
* Circulation disturbances, catabatics effects, local circulation.
* Meteors and local phenomena.
* Meteorological aspects as regards navigation through Drake Passage and Bellingshausen and Weddell seas.
* Special phenomena acting upon operations.
* Basis for the interpretation of satellite images and weather systems.

## Sea ice and ice floes

* Identifying sea ice and floes.
* Stages of evolution, shapes, deformation processes, cracks in the ice, topography and fusion stages.
* Sea ice physical composition, its most significant characteristics and some regional peculiarities.
* Ice floe drifts in the Southern Atlantic and Weddell and Bellinghausen seas.
* Terms and Symbols for sea ice.
* Visual observations from coast, ship and helicopter.

## Terrestrial Glaciology

* General facts about dynamics, morphology and the influence of continental ice upon the Antarctic ecosystem.
* Ice barriers and glaciers.
* Ice barriers. Larsen, Filchner - Ronnie.
* Influence upon the balance of the oceanic system - atmosphere. Global changes and variation index.

## Antarctic Geology

* Geologic constitution of mainland and islands.
* Continental platform.
* Seismic data.
* Potential resources in the Antarctic.

## Oceanography

* Physical aspects of the Antarctic waters
* Tides and tide currents.
* Circulation and water masses, currents and waves.
* Antarctic Polar Front zone.

## Fauna

* Antarctic maritime ecosystem.
* Environmental factors
* Phytoplankton and zooplankton.
* Vertebrate and invertebrate fauna.

# FOREIGN AFFAIRS AND LEGISLATION

## Foreign Affairs

## International Law

* Normative aspects of navigation within area outlined by Antarctic Treaty.
* Necessary knowledge and information for politically correct proceeding, in light of the current international status.
* The ice considered as an object of international juridical regulation.
* The ice as a natural resource.
* The ice and environmental protection.
* Navigating ice-covered waters.
* Reference to ice as regards the implementation of juridical.

## Antarctic Treaty

* General description.
* Regulations.
* MARPOL agreement - Antarctic Treaty Protocol of environmental protection. Law n°24216
* Knowledge of laws and current regulations necessary for the avoidance of ship pollution.
* Basic understanding of contingency plans to be enforced in the case of incidents leading to Antarctic pollution.

## IAATO

# ECOLOGY

## Preservation of living resources

* Historical record. Commissions and conventions to regulate exploitation.
* Convention for the preservation of Antarctic marine living resources (CCRVMA)
* Concepts and regulations of CCRVMA.

## Environmental protection and preservation in the Antarctic.

* Scientific and political records pertaining to the environmental protection in the Antarctic.
* Antarctic Treaty protocol pertaining to environmental protection. Plus annexes.
* Main characteristics of the Antarctic environment.
* Tourism and environmental protection in the Antarctic.

# MARINE POLLUTION

## MARPOL. Response to spills in Antarctic area.

* The changes to society.
* The pollution.
* Ship pollution.
* National laws.
* International agreements.
* Contingency planning.

## Real experience in containment and clean-up actions in the Antarctic

* Starting situation.
* Pertinent actions
* Recommendations for the improvement of similar tasks.
* Conclusions

# NAVIGATION AND MARITIME SECURITY

## General features of ships suitable for Antarctic waters.

* Types of ships.
* Hull designs.
* Propulsion systems.
* Auxiliary elements
* Steering skills.

## Classifying ice-breakers

* Introduction.
* Requirements for ice-proof reinforcement.
* Requirements for ice-breaker reinforcement.
* Finnish - Swedish Ice Rules

## Ship preparation and set-up

* The influence of the external weather conditions upon material and personnel.
* General repairs. Specific items.
* Extra equipment to be considered.
* Material preparation before setting sail and during transfer.
* Personnel preparation and equipment.

## Operating in soft glacial waters

* Nautical characteristics of the area. Navigation aids.
* General facts about locations, manoeuvre and harbourage.
* Use of smaller vessels

## Operating in hard glacial waters

* Approach, entrance and cruising through ice fields
* Steering within ice fields.
* Vessels detained and trapped by the ice. Pertinent manoeuvres and general considerations.

## Operating with conventional ships.

* Specific precautions pertaining to the area
* Local characteristics of navigation and steering.
* Actions to improve security.
* Functioning in the presence of sea ice.

## Icebreaker main features.

* The hull.
* The propulsion.
* Auxiliary systems.
* General facts about manoeuvre.

## Operating with icebreakers

* Independent functions
* Assistance operations
* General information about convoying.

## Helicopter operations from ship

* Main features of helicopters suitable for operating in the Antarctic area.
* Vertrep (vertical replenishment)
* Search and rescue at sea.
* Glaciological and reconnaissance flight
* Common factors influencing upon helicopter operations.

## Navigation aids

* Hydrographic surveying.
* Mapping of Antarctica.
* Antarctic toponymy.
* The electronic charts.
* G.P.S.
* Radar use in the Antarctic region.
* General information.
* Strengths and weaknesses of modern devices.
* The A.R.P.A. radar.

# RECENT NAUTICAL AND COMMANDING EXPERIENCE

## Set-up, planning and advanced leading of a campaign in the Antarctic.

* Plan.
* Assigning tasks, purposes and scenarios.
* Writing.
* Monitoring.
* Recommendations.

## Operations with an auxiliary ship.

## Operations with an auxiliary research ship.

## Last campaign to the Antarctic.

## Other experiences in the Antarctic.

## Operations with small crafts.

## Operations with tour ships.

# SURVIVAL IN THE ANTARCTIC

## Survival on earth.

* Procedures to be met during an emergency.
* Shelter.
* Cohabitation rules.
* Ice cracking zone.
* Necessary items.
* Signs.

## First Aid

* Preventive guidelines against frost.
* Bone fractures
* Skin burns.
* Colds and frostbite.

## Survival at sea

* Being adrift in cold waters
* Possible evacuation scenarios.
* Equipment and proceedings for evacuation of ships.
* Floating survival.
* Food and water.
* Means of communication.
* Immersion in cold waters.
* Loss of heat during immersion.
* Hypothermia.
* Polar and ice diving.
* Equipment for such purpose in the Antarctic.