

Arctic and Cold Climate

Capability and Experience



Capability Overview

INTECSEA actively supports our customer in planning for offshore development in the Arctic and has assisted in customer tenders for leasing new Arctic offshore acreage. Our floating systems expertise has also been active in developing composite steel and concrete gravity-based designs that handle Arctic ice loads as part of concept development for customers planning Arctic drilling and production facilities.

Oil and gas pipelines on the Arctic Ocean continental shelf must typically address trenches up to 6m deep for seabed ice gouge protection and floating construction equipment working only during two or three months during the summer open water season. INTECSEA has engineered all three pipeline systems in the Beaufort Sea using innovative design approaches and is presently supporting the energy industry as planned conventional and subsea field developments move deeper into the Arctic Ocean.

Services

- Arctic Development Concept Evaluation
- Subsea Development Studies
- Pipeline FEED & Detailed Design
- FPSO & GBS Design
- Offshore & Overland Route Selection
- Construction Support
- Project Management

60+

Arctic Projects

25

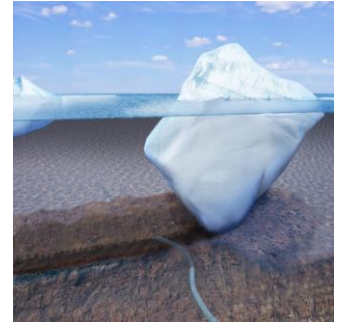
years of Arctic experience



Engineering Services

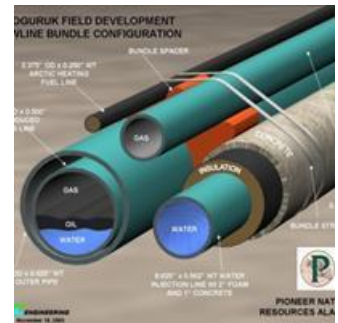
Arctic Pipeline Design

Unique pipeline design aspects for Arctic conditions include analysis of the potential effects of Arctic-specific environmental loadings (ice scour, strudel current scour, permafrost), and the effective use of limit state design for extreme loading conditions. Evaluation of these unique design-loading conditions and use of a limit state design philosophy have been successfully used by INTECSEA for offshore Arctic pipelines.



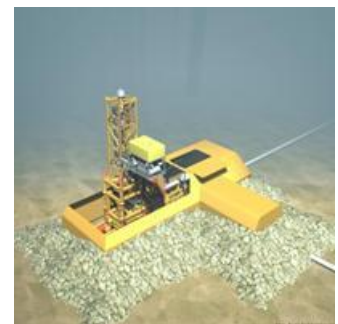
Arctic Insulated Flowline Design

INTECSEA has extensive expertise in the design of flowlines related to high pressure/high temperature applications. Pipe-in-Pipe (PIP) and bundled flowline methodologies have been the primary HP/HT flowline design concept. Insulation has been evaluated for Arctic applications to prevent permafrost degradation. Flexible pipe can also be utilized to absorb expansion loads/displacements at the ends of the flowline, or they can be utilized for the entire flowline to absorb expansion and relieve axial stress.



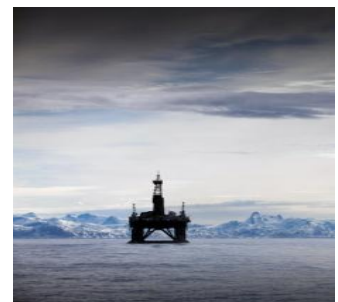
Arctic Subsea Field Development

Numerous studies have been performed at INTECSEA to develop potential subsea oil and gas production scenario options, addressing the conceptual engineering and field layout of subsea wells, manifolds, and pipelines producing to a gravity-based structure or to shore. INTECSEA also develops conceptual installation and construction execution procedures along with conceptual field development schedule and cost estimating. This is done considering limited open water and ice-cover seasons. Activities also include the identification of operational risk and potential new technology pertinent to the project.



Arctic Structures and Marine Systems

INTECSEA provides a full suite of engineering services for offshore Arctic structures and marine systems to encompass the full range of project development and execution. These include the development of design criteria, ice load analysis, feasibility studies of different support sites, and fixed structures design. The Arctic GBS hull, scantling, ice walls, and materials are all part of the structural design process.



Project Experience

Project: Shtokman Field Pipeline and Riser Study

Client: Various Customers

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Comprehensive technical and economic study of the marine pipelines between the Shtokman Field and possible landfall sites near Murmansk.

An international consortium of companies planned the development of the Shtokman Gas Field located in the Russian Barents Sea, 550 km offshore from the coast of the Kola Peninsula in 330m water depth. This part of the Barents Sea is normally open water, but icebergs and nearshore first-year ice are possible.

A comprehensive technical and economic study of the marine pipelines between the Shtokman Field and possible landfall sites near Murmansk was performed by INTECSEA.

Shtokman Gas Field, Russia



Project: BP Alaska Northstar Pipeline Project

Client: BP Exploration

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Concept selection, procurement design, permitting support, specifications, procurement assistance, inspection services, offshore and onsite construction support and start-up support.

Located in 37 ft water depth, six miles offshore the Alaskan Beaufort Sea coast, this project was developed by expanding the exploratory gravel island to accommodate wells, production facilities and living quarters. Produced oil is exported through a 10-inch pipeline to the Trans Alaska Pipeline System. This is the world's first offshore Arctic project to transport oil through a trenched subsea pipeline. The pipeline design utilized limit state strain criteria to meet the challenges of an Arctic environment and marginal field economics.

BPXA Northstar Oil Field Alaska



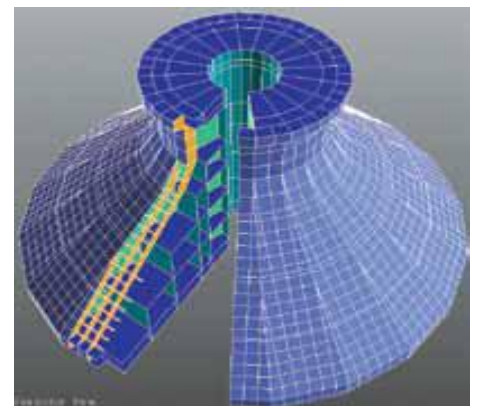
Project: Arctic Steel Gravity-Based Structure

Client: Confidential

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Preliminary and detailed design for an Arctic GBS structure was performed, including structure sizing and optimization, ice load calculations and analyses for various ice loading conditions using probabilistic methods, ice wall structural analyses/design and ice ride-up assessments, keel and skirt design, foundation analyses and design, and a review of acceptable installation and placement options for the specific location identified for the project. Work also included development of a program to optimize the global size of the GBS Platform for various environmental parameters, and a parametric study for ice walls designed using strain-based design criteria was performed.

Alaska, USA



Project: Oooguruk Offshore Field Development

Client: Pioneer Natural Resources Alaska, Inc.

Phases: IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

Engineering work included concept and design selection, installation and protection against arctic load conditions, detailed design, procurement support and construction support.

INTECSEA has been contracted to perform pre-FEED, FEED, construction support and detailed design for the development of the Oooguruk Field in Alaska's Beaufort Sea. Drilling is from the offshore gravel island located in approximately 5ft of water. This is will be the second subsea Arctic oil production pipeline, following the successful start-up of BP's Northstar pipelines in 2001 (also designed by INTECSEA). Produced fluids are gathered and transported to shore in a buried subsea three-phase flowline. Inshore, the flowlines transition to above-ground insulated lines and run to an existing pipeline at a drilling facility owned by another operator.

Oooguruk Field, Alaska



Project: Kashagan East Field Development Experimental Program

Client: Agip KCO

Phases: IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

A joint venture between WorleyParsons and Fluor, with subcontractors Tecnomare and NIPneftegas, known as Kashagan Development Project Contractors, has been awarded the conceptual design, FEED and management support services (MSS) contract for the development of the first block of the East Kashagan Field Development, the first offshore project in Kazakhstan. The Kashagan field is the largest oilfield in the North Caspian Sea PSA contract area and is considered to be one of the largest hydrocarbon discoveries of the last 30 years worldwide.

North East Caspian Sea and Eskene, Kazakhstan



Project: Nikaitchuq Field Development

Client: Kerr-McGee Oil & Gas Corporation

Phases: IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

Pipeline concept selection, flow assurance, pipeline mechanical design, protecting against seabed ice gouging, permafrost thaw settlement, strudel scour, upheaval buckling and channel migration.

INTECSEA was contracted to perform pre-FEED, FEED, detail design and construction support on subsea flowlines for the Nikaitchuq Field offshore the coast of the North Slope of Alaska's Beaufort Sea. The flowline and utility bundle will connect to a new onshore facility built at Oliktok Point to process the Nikaitchuq production. The Nikaitchuq production facilities will include between one and four gravel island drill centers connected by intrafield flowlines for transporting the three-phase production, gas and injection water. The water depth at the drill centers ranges from 6 to 10 feet. Produced oil, gas and water injection lines will run from one of the islands to the onshore process facilities.

Spy Island, Alaska



About INTECSEA [\(click here to learn more about INTECSEA\)](#)

For more than 25 years, INTECSEA has provided frontier technology leadership for the energy industry's most challenging offshore field development and pipeline projects.

INTECSEA was formed in 1984 and provides design for floating systems, risers, pipelines, and subsea engineering and construction management services within the global WorleyParsons Group. INTECSEA has established operating offices in Houston, Kuala Lumpur, Singapore, Delft, Rio de Janeiro, Jakarta, Angola, Cairo, St. John's, Perth, Melbourne, and London. [\(see all WorleyParsons' locations\)](#)

INTECSEA's major areas of expertise include deepwater subsea and floating production systems, marine pipeline and riser systems, Arctic pipelines, marine terminal systems, and Arctic structures. Additional areas of expertise include flow assurance and operability, marine surveys, marine operations and offshore equipment design.



A History of Innovation and Benchmark Achievements...

SUBSEA

- Deepest Subsea Production
- Longest Oil Tieback
- Longest Gas Tieback
- First Subsea Allocation Flow Meters
- First 15,000 psi Subsea Trees
- First Electrically Heated Pipe-in-Pipe Flowlines
- Deepest Multiphase Subsea Pumps
- First Super Duplex Umbilical
- First Diaphragm Chemical Injection System

RISERS

- First Pipe-in-Pipe Steel Catenary Riser
- First Reeled Steel Catenary Riser
- The Deepest Steel Catenary Risers
- Most Shallow Catenary Riser
- Largest Diameter Flexible SCR Joint
- First SCRs on an FPSO
- Most Direct Vertical Access Risers
- First GOM Free-Standing Riser

FLOATING SYSTEMS

- Largest FPSO
- Deepest TLP at Time of Installation
- Deepest SPAR at Time of Installation
- Most Installed TLPs
- First Deepwater FPU Operated with a Drilling Tender
- Most Types of Floating Systems

MARINE PIPELINES

- Deepest S-lay Pipeline
- Deepest J-lay Pipeline
- Longest Offshore Pipeline
- First Offshore Arctic Pipeline
- First Arctic Pipeline Leak Detection System
- First Piggable Wyes
- First Arctic Pipeline Bundle

(for more capabilities information [click here](#))

Global Reach,
Local Knowledge,
Global Solutions



For further information about
our global capability, email
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