INTECSEA
WorleyParsons Group

Arctic and Cold Climate

Capability & Experience

INTECSEA's experience in the Canadian, US, and Russian Arctic offshore and onshore regions positions INTECSEA in the forefront of Arctic technology development for onshore and offshore pipelines and associated facilities.

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.

Capability Overview

WorleyParsons and INTECSEA are world leaders in design and construction of oil and gas production facilities located in remote, hostile environments. Innovative solutions have consistently been implemented to solve unique challenges associated with revamp, modernization, and grassroots projects above and below the ice in these environments.

Engineering design and construction management of Arctic pipeline and transportation have been one of INTECSEA's core activities since the company was formed in 1984. There are distinct and unique aspects of pipeline design for offshore Arctic environments which offer challenges to the designer. INTECSEA has been responsible for feasibility assessments, designs, and construction of Arctic pipelines for more than 30 years. 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.

Oil and gas pipelines on the Arctic Ocean continental shelf must typically address trenches up to 6 m 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 currently operational 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 Arctic and other ice-covered waters.

Services

- Arctic development concept evaluation
- Subsea development studies
- Pipeline FEED and detailed design
- FPSO and GBS design
- Offshore and overland route selection
- Construction support
- Project management

Engineering Services

Arctic Pipeline Design

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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, a floating facility, 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 seasonal ice cover.

Activities also include the identification of operational risk and potential new technology pertinent to the project.

Arctic Insulated Flowline Design

INTECSEA has extensive expertise in the design of flowlines related to High Pressure/High Temperature (HP/HT) 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 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

Shtokman Field Pipeline and Riser Study

CUSTOMER Various

LOCATION Shtokman Gas Field, Russia

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 330 m 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.

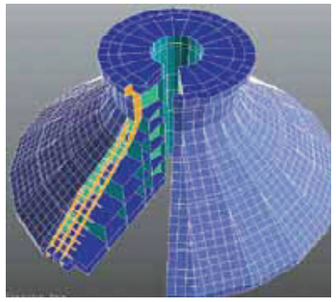
BP Alaska Northstar Pipeline Project

CUSTOMER BP Exploration

LOCATION Northstar Oil Field, Alaska

IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

Located in 37 feet of water, 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.



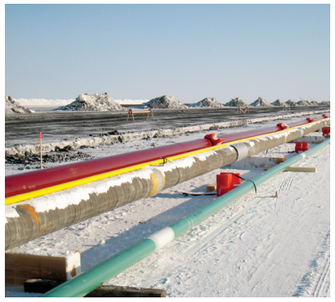
Arctic Steel Gravity-Based Structure

CUSTOMER Confidential

LOCATION Alaska, USA

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.



Oooguruk Offshore Field Development

CUSTOMER Pioneer Natural Resources Alaska, Inc.

LOCATION Oooguruk Field, Alaska

IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

INTECSEA has been contracted to perform pre-FEED, FEED, construction support, and detailed design for the development of the Oooguruk Field, Beaufort Sea. Drilling from the offshore gravel island located in approximately 5 feet 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 (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.

Nikaitchuq Field Development

CUSTOMER Kerr-McGee Oil & Gas Corporation

LOCATION Spy Island, Alaska

IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

INTECSEA performed pre-FEED, FEED, detail design, and construction support on subsea flowlines for the Nikaitchuq Field. 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.

Kashagan East Field Development Experimental Program

CUSTOMER Agip KCO

LOCATION North East Caspian Sea and Eskene, Kazakhstan

IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

A joint venture between WorleyParsons and Fluor, with subcontractors Tecnomare and NIPIneftegas, (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.

Success Through Insight

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