

**CAPITAL AND OPERATING COSTS****APPLICATION FOR APPROVAL  
OF THE DEVELOPMENT PLAN FOR  
NIGLINTGAK FIELD  
PROJECT DESCRIPTION****COST ESTIMATE BASIS****14.1.1 SCOPE**

This section provides cost information for developing the Niglntgak field, including:

- historical drilling, seismic and development capital expenditures
- estimated future development capital costs over the development's life
- estimated future annual operating costs

Only those costs directly associated with the development of the Niglntgak gas field are included in these estimates. Costs associated with developing other components of the Mackenzie Gas Project are documented in separate regulatory applications.

**14.1.2 HISTORICAL COSTS**

Historical costs for the Niglntgak field include expenditures for:

- exploration and delineation drilling
- well evaluations
- seismic acquisition and processing
- regulatory preparation
- abandonment and reclamation

These historical costs have been categorized and adjusted to constant 2003\$, based on annual average Consumer Price Index (CPI) information. Table 14-1 outlines Niglntgak expenditures from 1970 to 2003, including conceptual engineering costs associated with preparing the current development plan application.

## CAPITAL AND OPERATING COSTS

## COST ESTIMATE BASIS

Table 14-1: Costs for Niglintgak Field – 1970 to 2003

Year	As Spent (\$Million)				CPI Index (millions)	Total Costs (\$Million)
	Drilling	Seismic	Regulatory Preparation	Total Costs		
1969	0	0.1	0	0.1	5.2	0.7
1970	0	0.1	0	0.1	5.0	0.7
1971	0	0.2	0	0.2	4.9	0.8
1972	0	0.7	0	0.7	4.7	3.1
1973	4.9	0.4	0	5.3	4.4	23.1
1974	3.7	0.6	0	4.3	3.9	16.8
1975	9.3	0.1	0	9.4	3.5	33.3
1976	9.8	0.3	0	10.2	3.3	33.3
1977	0	0	0	0	3.0	0
1978	0	0	0	0	2.8	0
1979	0	0	0	0	2.6	0
1980	0	0	0	0	2.3	0
1981	0	0	0	0	2.1	0
1982	0	0	0	0	1.9	0
1983	0	0	0	0	1.8	0
1984	0	0	0	0	1.7	0
1985	0	0	0	0	1.6	0
1986	0	0	0	0	1.6	0
1987	0	0	0	0	1.5	0
1988	0	0	0	0	1.4	0
1989	0	3.2	0	3.2	1.4	4.3
1990	0	0	0	0	1.3	0
1991	0	0	0	0	1.2	0
1992	0	0.1	0	0.1	1.2	0.1
1993	0	0	0	0	1.2	0
1994	0	0	0	0	1.2	0
1995	0	0	0	0	1.2	0
1996	1.4	0	0	1.4	1.1	1.6
1997	0	0	0	0	1.1	0
1998	0	0	0	0	1.1	0
1999	0	0	0	0	1.1	0
2000	0	0	0.3	0.3	1.1	0.3
2001	0	0	0.9	0.9	1.0	0.9
2002	0	0	0.7	0.7	1.0	0.7
2003	0	0	4.2	4.2	1.0	4.2
Total	29.1	5.9	6.1	41.1	N/A	123.9

Note: Numbers might not add up because of rounding.

**CAPITAL AND OPERATING COSTS****APPLICATION FOR APPROVAL  
OF THE DEVELOPMENT PLAN FOR  
NIGLINTGAK FIELD  
PROJECT DESCRIPTION****CAPITAL COST ESTIMATE****14.2.1 SCOPE**

The current capital cost estimate for the Niglntgak development is based on the conceptual design described in this development plan application. Although the conceptual design will be further refined, this cost estimate is believed to be accurate for the scope defined. The capital cost estimate includes costs for:

- regulatory application preparation
- well drilling and completions
- project management
- design, procurement and construction of production facilities and flow lines
- procurement of materials and services
- precommissioning

**14.2.2 DRILLING AND COMPLETIONS**

Drilling and completion cost estimates are based on:

- drilling six production wells and one disposal well. Incremental future wells to further optimize recovery have not been included.
- drilling operations conducted over three winters, using two drilling rigs
- drilling time estimates, based on the proposed well designs, considering Niglntgak's drilling conditions and recent exploration well drilling performance for the Mackenzie Delta
- material and time estimates for well completion and testing, based on conceptual well designs, and considering arctic conditions
- materials and services costs that are based on vendor quotes and include transportation from the source to Niglntgak

The cost estimates also include:

- modification of existing drilling equipment for arctic conditions
- transportation and standby costs for equipment and personnel
- mobilization and demobilization of drilling equipment and camps

### 14.2.3 FACILITIES

The Niglintgak capital cost estimates were factored from major equipment requirements to estimate the installed cost of production facility units. These estimates were based on:

- the conceptual process design (see Section 7, Production Facilities)
- using both Shell's and contractors' historical cost databases containing information on similar projects or similar locations
- budgetary quotes for specific major equipment acquired from vendors
- historically derived factors for major equipment bulks
- experience of labour productivity in different construction locations
- transportation, infrastructure and logistics costs estimated from combined vendor and historical cost information
- average gas conditioning facility fabrication costs associated with international construction
- 2003 estimates of construction equipment and labour rates

### 14.2.4 PRELIMINARY COST ESTIMATE

The preliminary capital cost estimate (see Table 14-2) is based on:

- an accuracy level of +25/-15% and an equal chance of overrun and underrun
- an assumption that adequate labour and construction resources are available to complete the development as planned
- contingencies of 15 to 20% for different elements of the development
- the exclusion of the goods and services tax (GST) and provincial sales tax for any materials, equipment or services
- constant 2003\$ Cdn subject to the annual inflation rate when capital costs are incurred
- an assumption that goods and services will be acquired on an internationally competitive basis

**Table 14-2: Preliminary Capital Cost Estimate (\$Million 2003)**

<b>Year</b>	<b>Regulatory Application Support<sup>1</sup></b>	<b>Facilities Construction</b>	<b>Development Drilling</b>	<b>Total</b>
2004	3.6	0.0	0.6	4.2
2005	6.4	0.0	0.7	7.1
2006	9.0	23.4	4.7	37.1
2007	0.0	119.0	30.8	149.8
2008	0.0	70.0	43.0	113.0
2009	0.0	21.0	32.0	53.0
<b>Total</b>	<b>19.0</b>	<b>233.4</b>	<b>111.8</b>	<b>364.2</b>
Note: 1. Includes Niglintgak predevelopment project management costs.				



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PROJECT DESCRIPTION****ANNUAL OPERATING COST ESTIMATE****14.3.1 SCOPE**

Annual cost estimates for the operation and maintenance of the Niglintgak field were prepared based on:

- six production wells and one disposal well
- 10 km of flow lines
- a gas conditioning facility that includes:
  - separation
  - compression
  - dehydration
  - refrigeration
- gas conditioning utilities systems

**14.3.2 OPERATING AND MAINTENANCE COSTS**

The operating and maintenance cost estimate for Niglintgak is based on Shell's experience in gas field operations throughout Canada. Alberta-based operating costs were adjusted to reflect operating remote arctic facilities. Periodic major maintenance activities and well interventions were included in developing an average annual cost estimate over the life of the facility.

The operating cost estimate includes costs for:

- well pad operations, including periodic well interventions and routine maintenance
- on-site and off-site operations and maintenance staff
- routine and major maintenance costs for production facilities
- all consumables, goods and materials for well pads, flow lines and the gas conditioning facility
- routine inspections
- accommodation and catering for on-site personnel

**14.3.2 OPERATING AND MAINTENANCE COSTS (cont'd)**

- logistics and transportation support
- property taxes, access fees and insurance
- management and administration (local and head office)
- abandonment and reclamation

Fuel gas will be supplied from the processed gas stream leaving the facility and is included as gas shrinkage, not as an operating cost.

Table 14-3 shows the preliminary operating cost estimate for the Niglintgak field in constant 2003\$.

**Table 14-3: Preliminary Annual Average Operating Cost Estimate (\$Million 2003)**

<b>Activity</b>	<b>Total</b>
Operations	1.2
Maintenance	2.7
Logistics	3.2
Well work	0.7
Modifications	0.2
Taxes and access	1.2
Management and administration	0.9
Total cost	10.1