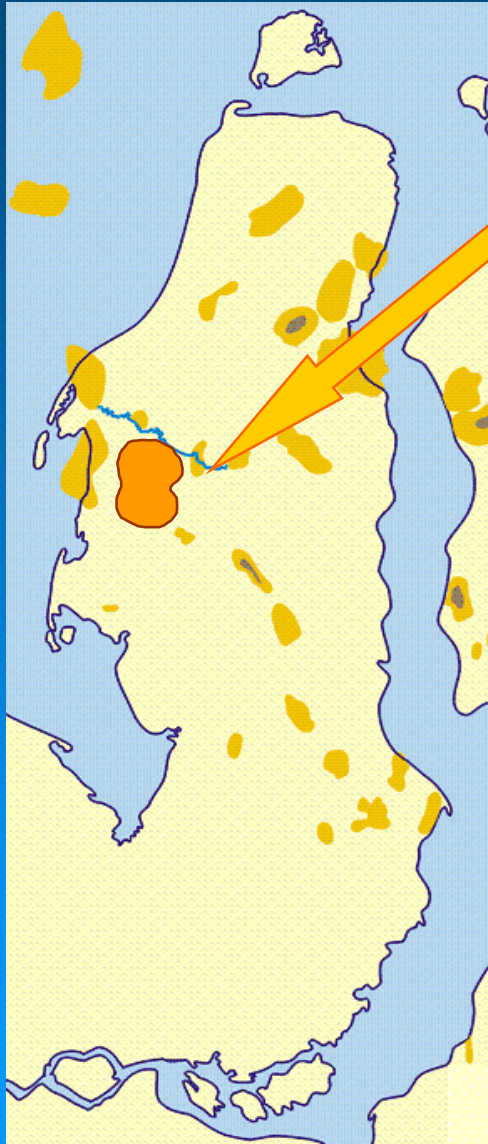


# Bovanenkovo

## Yamal Major Field



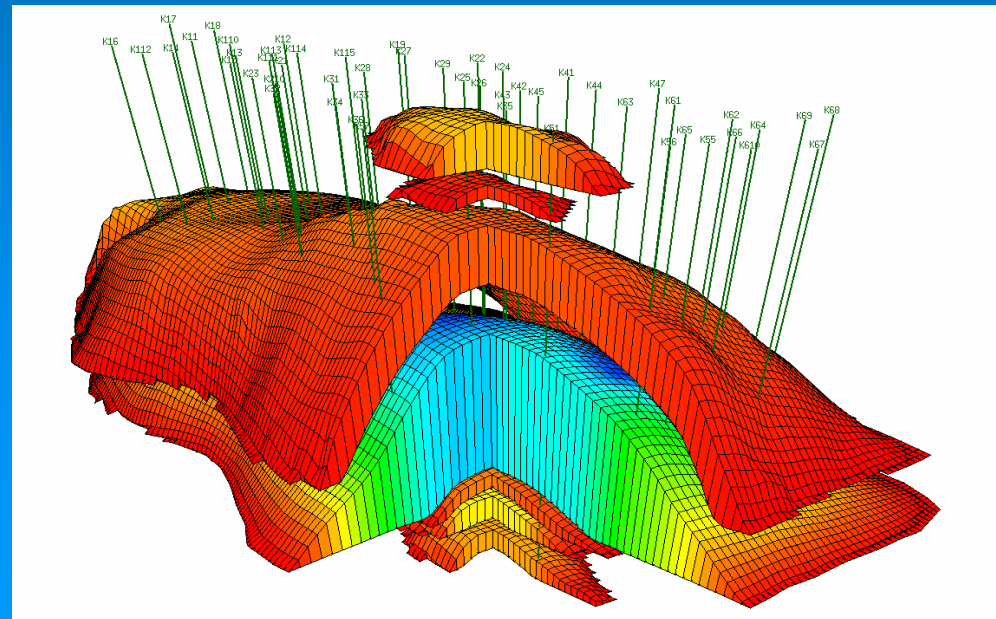
# BOVANENKOVO FIELD



**Bovanenkovo** field is a base field of the Yamal peninsula at present time. All the scientific and technological tasks of Yamal fields development were solved by VNIIGAZ.

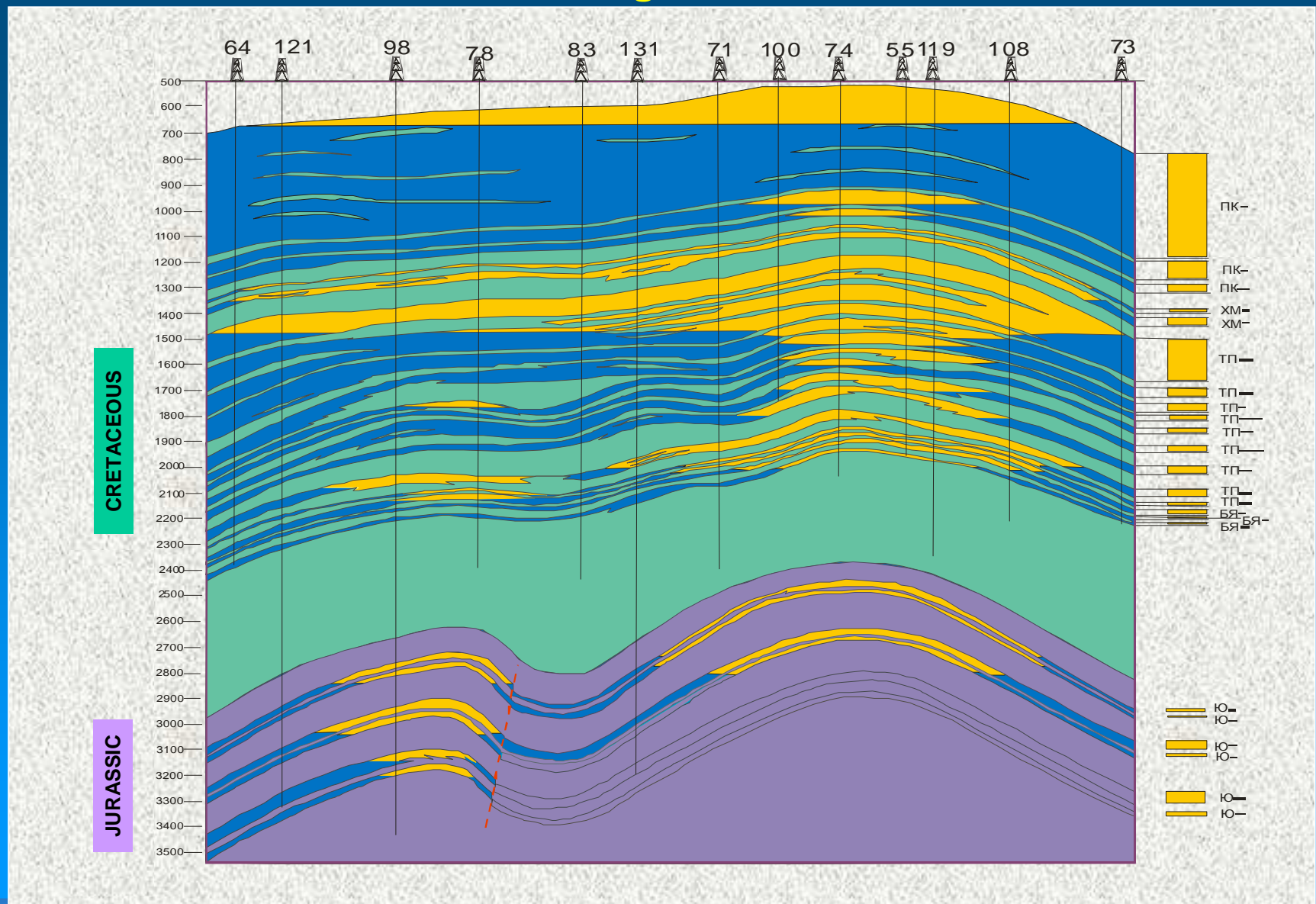
Explored gas reserves of Bovanenkovo field exceed 3.5 Tcm. Most part of them refer to Apt-Cenomanian deposits.

They will start the fields development



# BOVANENKOVO FIELD

## Geological section



# BOVANENKOVO FIELD

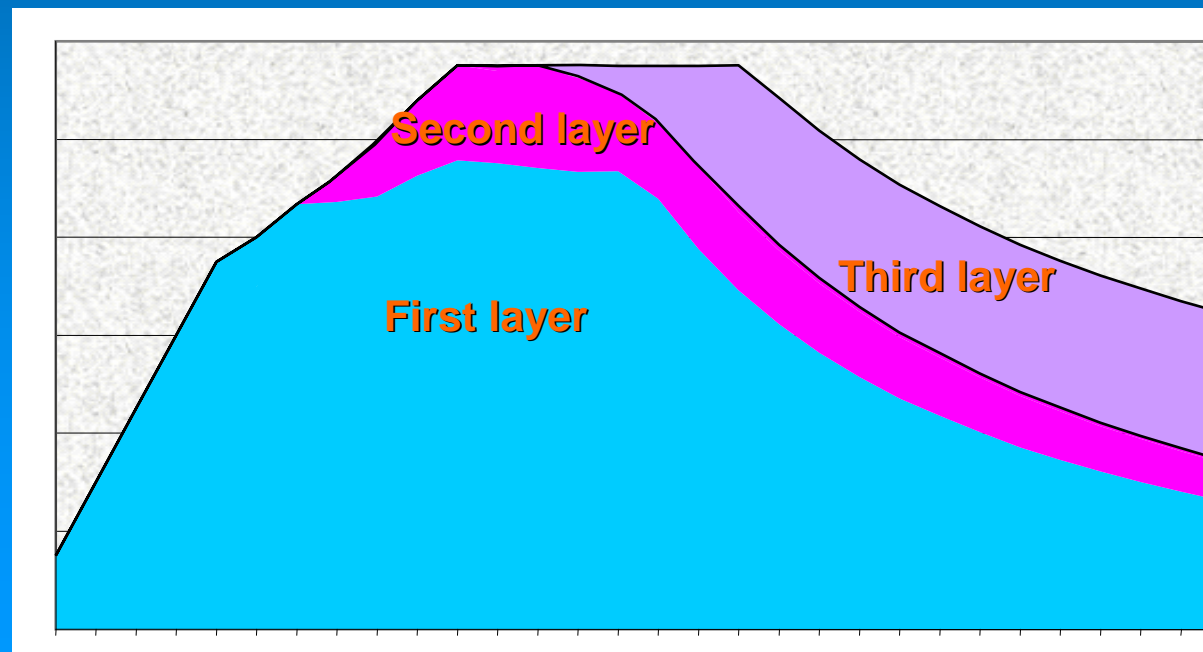
Proven gas resources, Bcm

Object of development	Layers in object of development	Approved in State Committee of Resources, 1982 г.	
		C <sub>1</sub>	C <sub>2</sub>
I	PK <sub>1</sub>	870.8	
II	PK <sub>9</sub> , PK <sub>10</sub> , HM <sub>1-2</sub> , TP <sub>1-6</sub> , TP <sub>7-8</sub> , TP <sub>9</sub> , TP <sub>10-11</sub>	2579.9	32.4
<b>TOTAL</b>		<b>3450.7</b>	<b>32.4</b>

# BOVANENKOVO FIELD

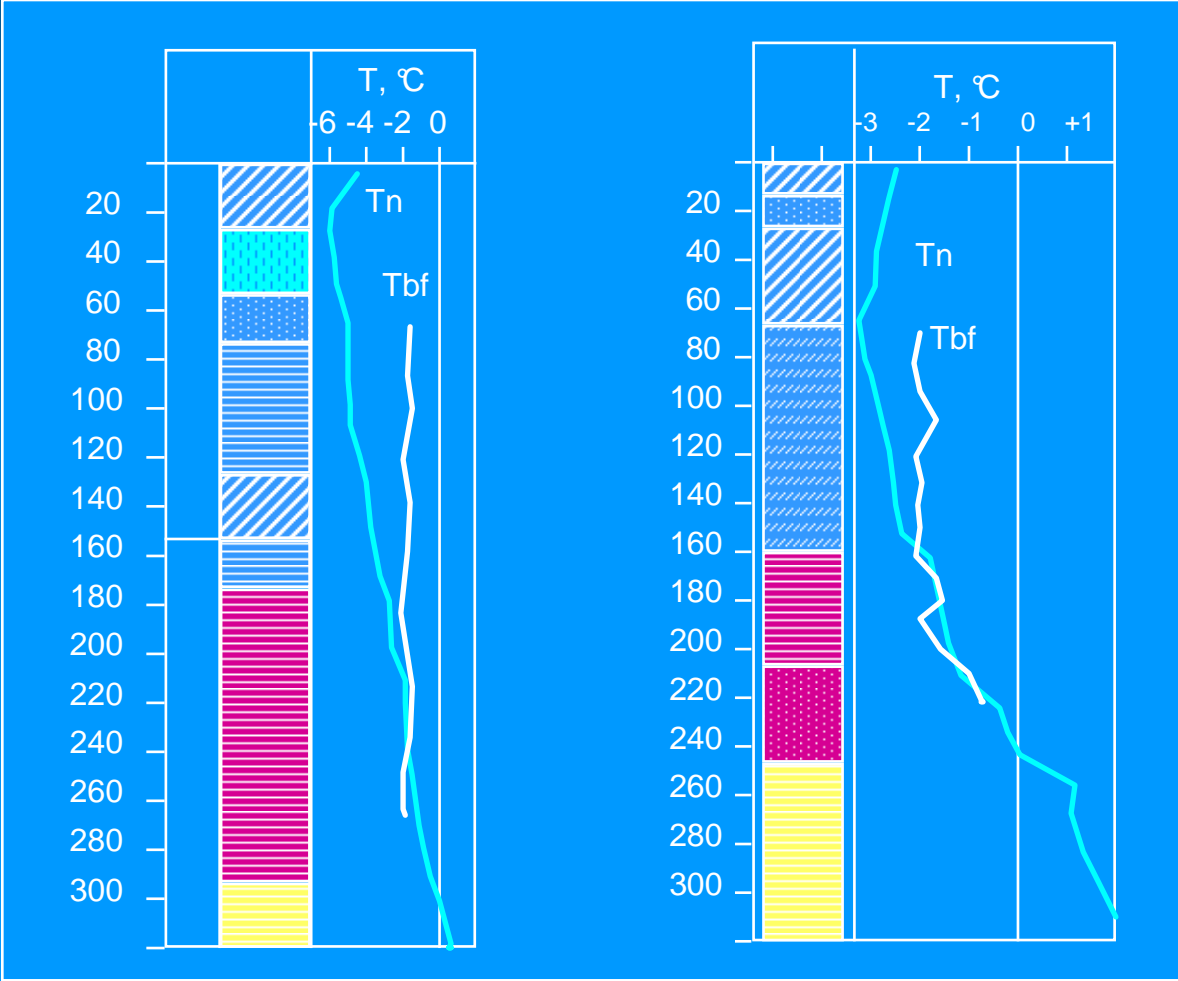
Synchronous start of development of layers with different reservoir pressure required to join in same cluster wells with different head pressures. In this case it should be constructed two gas gathering systems, i.e. low and high pressure.

Optimized strategy of field development based on construction of one gathering system. In this case start of development and the production of each layer are determined by the level of well head pressure.



# BOVANENKOVO FIELD

## SCHEME OF PERMAFROST



- permafrost rocks
- cooled rocks
- melted rocks
- ice

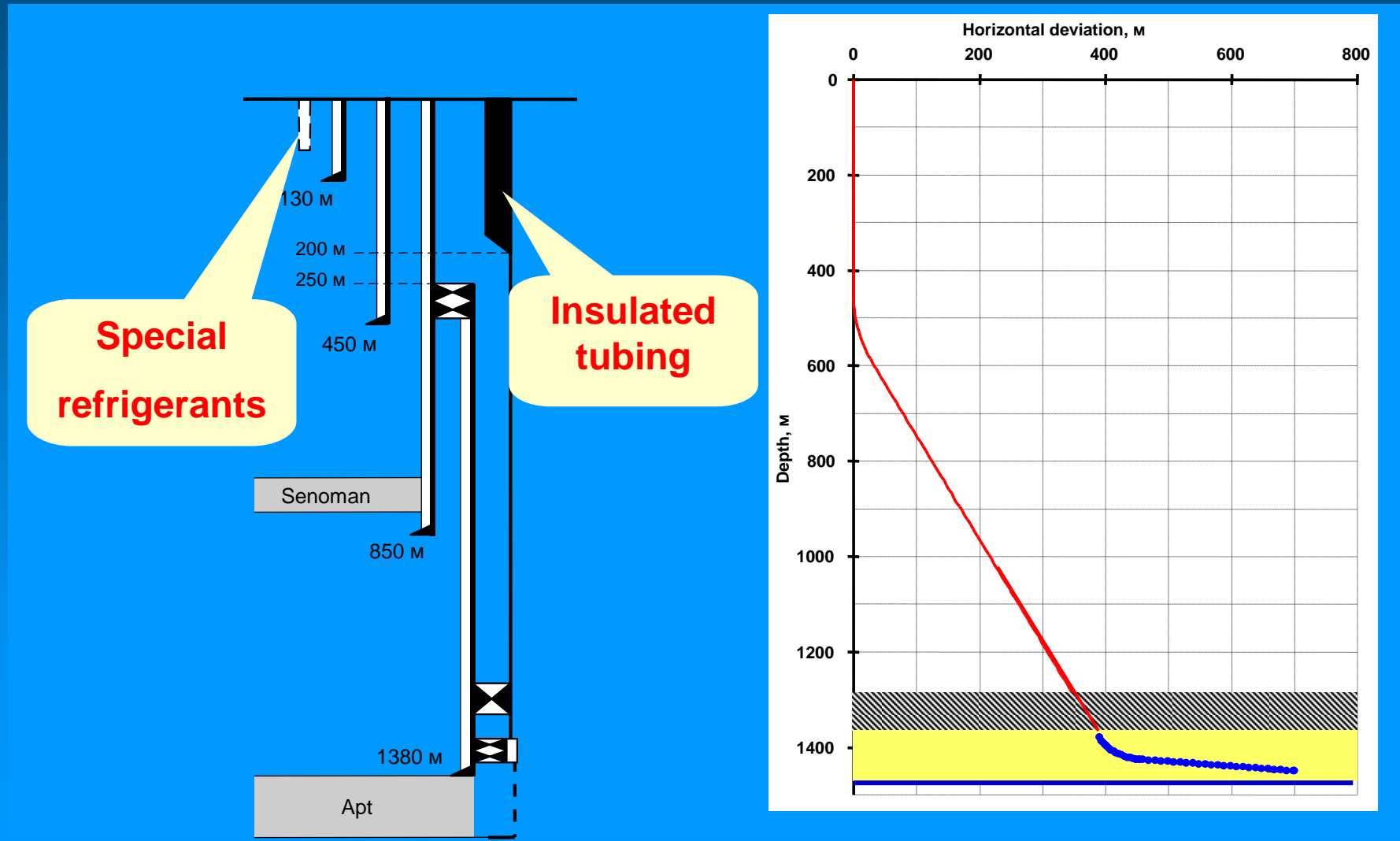
Tn – natural temperature

Tbf – experimental of water freezing in rocks



# BOVANENKOVO FIELD

## Design of horizontal well



# BOVANENKOVO FIELD

## Choosing of well construction and well clusters location

Ice content < 20% or from 20 to 40%  
and thickness < 10-15 meters.

Well without insulated tubing.

Ice content > 20% and thickness < 25 meters.

Well with insulated tubing.

Ice content > 40% and thickness > 25 meters.

a) Special refrigerants and well with insulated tubing.

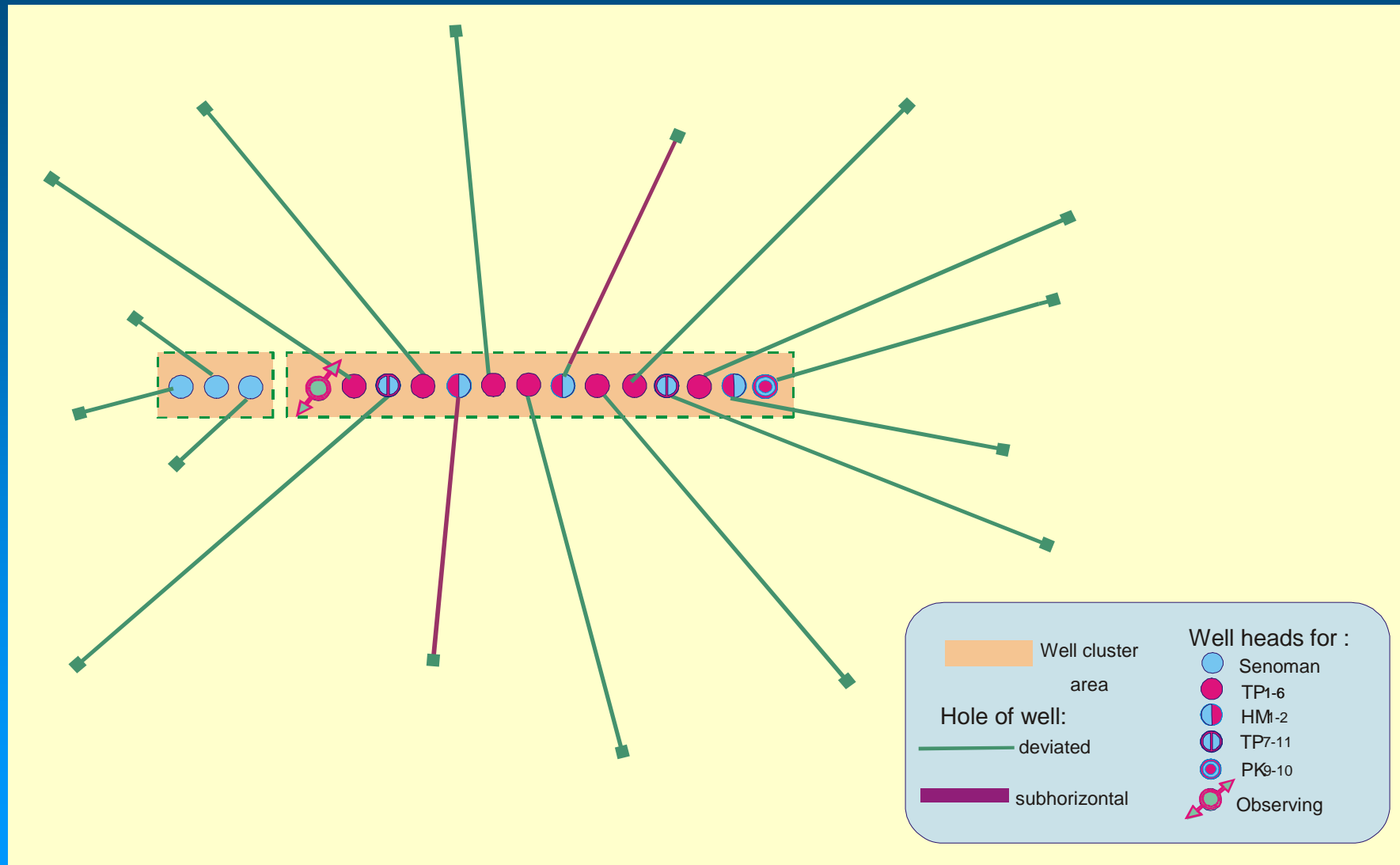
b) Move the well clusters





# BOVANENKOVO FIELD

## Scheme of well cluster



# BOVANENKOVO FIELD

The introduction of new engineering solutions, developed in VNIIGAZ into the Bovanenkovo field development will make it possible to cut considerably starting investments, to ensure operation safety of wells and field equipment, to reduce metal content and to meet ecological requirements. The improvement of economic indices made the project competitive in the current conditions and allowed considering it as one of the priority targets of Gazprom.

# BOVANENKOVO FIELD

The main problems of the Yamal resource commercial development are related to environmental protection. To tackle this problem JSC Gazprom has worked out an Advanced research program. The program is intended for developing environmentally sound technologies, minimizing environmental impacts and preserving and developing unique culture, ethnoses and traditional forms of activity of local nations.

The results obtained made it possible to conclude that the commercial development of Yamal gas fields, including the construction of gas mains and railway, will not lead to irreversible ecological consequences on the peninsula.

**THANK YOU  
FOR ATTENTION**

# BOVANENKOVO FIELD

Carried out in VNIIGAZ investigations showed that maximal technological and economic efficiency, minimal environmental impact will provide:

- Construction of one gas gathering system;
- Well commissioning for various objects at equalizing the well head pressures;
- Drilling in the initial period of all the wells in the cluster with conservation of the idle wells until commencement of production;
- Opening of each operation object with separate system of wells.
- For maximal reduction of thermal loading on permafrost it is planned to use special thermal-insulation pipes. This allows to reduce the distance between the well mouths in one cluster to **20m**. Successful tests of the wells with such pipes have been already underway for several years at the field.