Project Presentation
Sakhalin-1 Arkutun-Dagi GBS Project

From reservoir to processing facility
We provide oil companies with cost-effective solutions for development of oil & gas resources in a safe and environmentally sound manner - world class project execution -
Concrete GBSs by Aker Solutions since 1971

HSES

OUR ULTIMATE GOAL:
NOBODY GETS HURT
NO NEGATIVE IMPACT TO THE ENVIRONMENT

OUR ACHIEVEMENTS SO FAR:
680 DAYS
4.5 MILL MANHOURS
WITHOUT LT'I'S
NO ENVIRONMENTAL INCIDENTS
GBS Concept

Design Challenges

- Topsides weight vs. functional requirements
- Drifting ice ridge loads on GBS and pipeline burial depth
- Winterization to -40F
- Concrete design and construction for an arctic environment with high seismic activity
- Maximum use of Russian labour and services
- High focus on environmental issues in a sensitive area, e.g. grey whales protection
- Ice Abrasion Resistant Concrete

GBS Key Figures

<table>
<thead>
<tr>
<th></th>
<th>GBS Key Figures:</th>
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<tbody>
<tr>
<td>Weight</td>
<td>~156.400 t</td>
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<tr>
<td>Concrete volume</td>
<td>~52,300 m³</td>
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<tr>
<td>Rebar quantity</td>
<td>~19,300 t</td>
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<tr>
<td>Post-Tensioning</td>
<td>~3,000 t</td>
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<tr>
<td>Steel Skirt</td>
<td>~1,100 t</td>
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<tr>
<td>Mechanical Outfitting</td>
<td>~1,200 t</td>
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<tr>
<td>Outfitting Steel</td>
<td>~2,300 t</td>
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Conditions*:
- Water Depth, LAT: 33,6 m
- Level ice up to: 1,4 m
- Wave heights up to: 16 m
- Wind speeds up to: 160 km/hr
- Possible earthquake activities
Mechanical Outfitting

Overall Schedule

<table>
<thead>
<tr>
<th>Project Activities</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td></td>
<td>1Q</td>
<td>2Q</td>
<td>3Q</td>
<td>4Q</td>
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<tr>
<td>Project Start</td>
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<td>Management and Engineering</td>
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<td>Site Build-Up</td>
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<tr>
<td>Construction of GBS</td>
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<tr>
<td>Mechanical Outfitting Including Prefabrication</td>
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<tr>
<td>Installation of Skirts</td>
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<tr>
<td>Construction of Base Slab, Walls and Top Slab</td>
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<tr>
<td>Shafts Construction and Top of Shafts Installation</td>
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<tr>
<td>Bund Wall Removal</td>
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<tr>
<td>Ready for Tow and Tow to Offshore Site</td>
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<tr>
<td>Offshore Installation and Completion of GBS</td>
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<tr>
<td>Project Completion</td>
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</table>
**Histogram – Direct work**

**ACTUAL PROGRESS: 54.9% (51.5% BL)**

**Construction Site. Helicopter perspective**
Sakhalin 2 CGBS Project
Construction Site with Casting Basin (dry dock)

Construction Site Overall Lay-out

1. Main Gate
2. Offices
3. Canteen
4. Clinic
5. Waste Handling Area
6. GBS Support Slab
7. Mock-up
8. Bund Wall
9. Batching Plant
10. Reinforcement Prefabrication Shed
11. T-Head Prefabrication Shop
12. Welding Workshop
13. MMO Workshop Shed
14. MMO Painting Shed
15. MMO Exotic Material Workshop
16. Maintenance / Repair Shed
17. Settling Ponds
18. Formwork Preassembling Area
19. Warehouse
Construction of the Vostochniy Dry Dock (15.01.04)

H=13, 25 m LAT
L=265 m
B=138 m

Typical cross section in Dry Dock Vostochniy

Accommodation Camp
GBS (Gravity Base Structure) – Regulatory Leadership

Our Actions

Managing Permits, Approvals and Licenses (SRO) without causing Construction delays will satisfy the Ultimate Client: Russian Federation Authorities

Results

- GBS Proekt SEER/SER concluded
- No delays caused by Regulatory
- 70 out of 120 permits obtained
- Hands on Experience in Russia
- Russian Content has priority
Russian content on the project

- Materials (weight ratio)
  - 97% Purchased in RUSSIA
  - 3% Imported

- Manpower
  - 92% Russian content
  - 8% Expats

- All rough materials: cement, sand, aggregate, rebar, steel profile etc.
- All trucks (exception – dumpers for basin digging), earthmoving equipment, mobile cranes and construction fleet (floating crane, tugs, barges, vessels)
- All personnel transportation services
- All Fuel, Wood, Electricity, Water, Telecommunication, Tools and majority of other consumables

Project Geography

- VNIIG: Russian compliance for concrete design, concrete mix, geotechnical and civil engineering
- Krylov: Russian compliance for Marine operation and Mechanical Outfitting
- Zvezdochka Eng.: Russian regulatory expertise, certification and procurement support

- HYDROTEX: Site design and engineering, ice abrasion concrete
- VOSTCO Yard: Landlord, Construction Site development
- EMDC: Legal, Commercial and HR support

- Topside Engineering: Russian Compliance for concrete design, concrete mix, geotechnical and civil engineering
- GBS Construction, Procurement and Project Management: Topside fabrication operation and Mechanical Outfitting
- PROKT: Ice abrasion concrete
- Monitoring Dry dock
Prefabrication and installation of mechanical parts of GBS:
- Far East plant “Zvezda”
- Dalzavod
- Nakhodka Ship Repair Yard
- Dalmormontazh-Vostochny

Civil construction (Concrete, rebar, formwork):
- Rosdorsnabzenie (RDS)
- ANBU (Nakhodka, local)
- and other various local companies

Materials:
- Rebar: “Amurmetal” (Amursk)
- Cement: “DV Cement” (Spassk)
- Crushed rock and sand – local companies

Prefabrication (Steel Skirt, 6MO Piping, etc.)

Dalzavod - Steel Skirt Section Prefabrication
Zvezda - Steel Skirt Section Prefabrication
NMP - 6MO Welding
Dalzavod/Slavyanka Yard
Towing and Installation

- Distance: 1010 nm
- Towing speed: 3 knots
- Towing duration: 14 days

Concrete Main Advantages

- Ability to withstand harsh environment
  - Low temperatures
  - Seismic
  - Ice
- Potential for oil storage
- Use of local material
  - Sand
  - Crushed rock
  - Cement
  - Rebar
- Use of local sub-contractors/labour
One Team – One Goal

Project Team focused on Common Vision and Goals, The collective result and People development

Project Social Responsibility

Engagement in Local Community Activities
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