GENERAL INFORMATION

Integrated services in the field of environmental protection, environmental safety, engineering and management

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Since 1996, the Kazakhstan Agency of Applied Ecology (KAPE) has been conducting its activities in the Republic of Kazakhstan in the sphere of environmental protection, natural resources conservation and management as an independent environmental consulting company. KAPE has its affiliated branches in the cities of Astana, Tbilisi, Atyrau, Aktau and Aktobe. KAPE affiliated branch in Tbilisi, Georgia was opened in March, 2016.

The philosophy of our activity is the thorough consideration of environmental legislation requirements, maximum compliance with Client requirements, competence, qualitative and prompt implementation of project works.
• Consulting in EP sphere;
• Developing EIA and EP sections, conducting public hearings;
• Developing emission standards projects: MPE, MPD, Waste generation and disposal limits project;
• Waste generation and disposal limits projects;
• Environmental audit;
• Monitoring of the environmental components, including - development of programs;
• Conducting IEM of economic facilities;
• Developing greenhouse gas emissions management projects (GHG);
• GIS and databases;
• Certification of workplaces on labor conditions;
• Justifying sizes of sanitary protection zones;
• Protecting and using water resources;
• Designing water conservation zones and belts;
• Hydrogeological surveys and monitoring of groundwater;
• Assessing the background status of the environmental components (offshore, onshore, water, air, soil, biota).

• Ichthyological and hydrobiological surveys;
• Background and environmental monitoring surveys;
• Engineering and environmental surveys;
• Geomagnetic and bathymetric offshore surveys;
• Engineering geodetic surveys of natural objects and engineering structures;
• Hydraulic modeling of river systems and canals;
• Forecasting flooding, destruction of hydraulic structures;
• Determining the size of flood areas, calculating areas of mudslides and mass transfers;
• A wide range of aerial work using unmanned aircraft system, including in mountainous and remote areas;
• Comprehensive assessment of the environmental, environmental and economic damage;
• Risk assessment, accident simulation, developing industrial production safety declaration.
Over the period of "KAPE" LLC operation, over 550 projects have been implemented for Ministries, State Committees, Akimat, National and International companies, enterprises and organizations. The main activity of KAPE is related to protection of air, water bodies, soil, wildlife and vegetation. Special position is occupied by the development of EIA, MPE, MPD projects and monitoring programs; obtaining of environmental permits etc.

MAJOR CUSTOMERS

- OKIOC/Agip KCO/NCOC 44%
- KazMunaiGas and its structures 12%
- National 0% companies
- State regulatory and economic bodies 24%
- Industrial enterprises and organizations 10%
Leading specialists of the Company are experienced in working at largest industrial facilities, scientific institutions and state environmental agencies of Kazakhstan.

The total number of personnel is 240, including: 14 candidates of science, 2 academicians and 1 associate member.
Experience in Working with State Authorities

Interaction of "KAPE" LLC specialists with the regulating authorities of the regional and republican level during development and coordination of projects

Projects development preparation stage

- Preliminary consultations with experts of environmental and sanitary regulatory bodies

Objective: 1. To develop common approaches to interpretation of individual provisions of the regulatory documents
2. To clarify position of controlling authorities in the field of environmental policy issues related to the region

KAPE LLC head office: project manager, responsible engineer

Atyrau KAPE LLC branch: expert

Projects development

- Repeated consultations if required

Projects expert review (sanitary, ecological and other State authorities)

- Submission of projects to the Expert Review

- Assistance in expert process: preparation of explanatory materials (texts, diagrams) and replies to comments

- Participation in the Expert Council: preparation of explanatory materials if required

- Updating of the project according to the comments of the Expert Council and Review

Head office: Project manager, responsible specialist, department specialists

Atyrau branch: expert

Preparation of request letters for the Ministries and Committees

Head office: Project manager

Submission of projects to repeated expert review

Atyrau branch: expert
For satisfaction of Customers’ requirements and granting of a qualitative product the Integrated Management System is introduced in KAPE LLC. The System integrates Quality management system (ISO 9001), Environmental management system (ISO 14001), Occupational health and safety management system (OHSAS 18001).

The management system is certificated by:

- International accreditation body – **AB Certification (France)**, and
- Kazakhstan accreditation body – **National center of expertise and certification**
Some of structural divisions are certificated on:

- ISO/IEC 17025-2007 (MEL, TL, HBL)
- IMO (Scientific Company vessels)
One of the major areas of work in KAPE is to develop projects to Assess Environmental Impact. During 1998-2015, KAPE has accomplished and obtained positive Opinion of the State Environmental Expert Evaluation for 189 projects. Including:

**Declaration / Pre EIA** - 27 projects  
**EIA** - 109 projects  
**Environmental Protection Section** - 53 projects

Projects were implemented for more than 70 companies - subsoil users, operating in Kazakhstan.

**Major Customs:**
- OKIOC / Agip KCO / NCOC  
- KarazhanbasMunay  
- Buzachi, KING  
- KazMunayGas, E&P KMG  
- Karachaganak Petroleum,  
- Kazzinc, EXXON,  
- INKAY, and others
AMBIENT AIR PROTECTION

TYPES OF WORK

- Inventory of air pollutant emission sources.
- Air MPE Projects
- Developing air protection and impact assessment sections in the EIA projects, HES sections to the project documentation.
- Inventory and monitoring of the physical impact sources in the companies.
- MPE standard projects of physical impacts.
- Certification of workplaces in the companies.
- Estimated sanitary protection zone projects.
- Estimated Risk Assessment of chemical air pollution factors to population health

SOFTWARE

As part of the PC “Era” in the Logos-Plus Company (Novosibirsk):
- ERA-UPRZA, ERA-GAZ, ERA-MPE
- Module Era-Climat (2011)
- Module Era- Medium (Version 2).
- Module Era-Risks (2011)

As part of the PC “Ecologist” in the Integral Company (St. Petersburg)
- MPE - Ecologist, Version 4.2
- Estimated block “Medium”
- Estimated block “Risks”
- Software “Ecologist-Noise 2.0”.


Areas of work:
• Inventory of greenhouse gas emissions;
• Developing installation passports along with the GHG monitoring plan.

Major Customers and projects:
1. Agip KCO (for NCOC and ENKA) - 6 projects (2008-2013).
3. For other companies – 19 projects (2013-2016).

Verification and validation of greenhouse gases
KAPE has certificates of accreditation dated 26.09.2013:

- Certificate No. 011 – to carry out activities to validate the report on the greenhouse gas inventory;
- Certificate No. 012 – to carry out activities to verify, validate in the field of emission mitigations and greenhouse gases absorption.

Accomplished work:
1. Installation Passports for offshore facilities in the Kashagan field, NCOC B.V. for 2013-2015
2. Installation Passports for onshore facilities in Mangystau region, NCOC B.V. for 2013-2015
3. Preparing justification for the amount of additional quotas for 2014-2015, MK.
4. Preparing justification for the amount of additional quotas for 2014-2015, NCOC B.V.
For the last years, the Company has performed more than 70 multiple works.

**Core customers of work are major oil and gas companies, such as** *Agip KCO, NCOC, Karachaganak B.V., KaraZhanbasMunay, Arman, TengizChevrOil, and etc.*.

Orders of the **RoK State Agencies** are performed on a continuous basis - *Fishery Committee, Forestry Committee, Committee for Water Resources of the RoK Ministry of Agriculture.*

Also, orders are performed for the natural resources departments in *Mangistau, Aktobe, Almaty, Kyzylorda regions; Subsoil Use Committees, akimats of Aktobe, Atyrau regions*.

**The main types of work:**

- Monitoring the quality of surface water and groundwater
- Environmental monitoring of dredging operations on the Caspian shelf;
- Assessing fish stocks in the Kazakhstan iPart of the Caspian Sea;
- Hydrobiological and ichthyological surveys;
- Assessing the current status of fish fauna and theriofauna in the Caspian Sea and other water bodies;
- Surveys of bottom sediments, soil, flora and fauna.
Chemical and analytical center (CAC) includes:

- Mobile environmental laboratories;
- Testing laboratory (Aktau).

✓ Laboratories are accredited in accordance with the “ST RK ISO/IEC 17025-2007 - General requirements for the competence of testing and calibration laboratories”.
✓ The Center employs 20 highly qualified specialists.
✓ The Center is equipped with the most modern equipment.
✓ Company has acquired and registered in the Register of the Republic of Kazakhstan for more than 60 techniques to work with the devices.

Laboratory Combined MRA Mark is an acknowledgement of the high quality of work performed by KAPE LLC.
SCOPE OF ACCREDITATION OF A TESTING LABORATORY

Water (drinking, natural), wastewater:
- Sampling, total salinity, pH, fluorides, sulfates, chlorides, phosphates, nitrates, nitrites, nitrogen, ammonium, COD, BOD, petroleum products (hydrocarbons), phenol and phenol derivatives, organic chlorine pesticides, volatile organic halogen compounds, heavy metals, surfactants, polycyclic aromatic hydrocarbons (PAHs), and others.

Ambient air in the residential and sanitary protection zones:
- Sampling, meteorological parameters, formaldehyde, phenol, hydrogen sulhide, PAH, aromatic and aliphatic amines, oxide and nitrogen dioxide, methanol, methyl mercaptan, sulfur dioxide, dust, gamma-emitting radionuclides, and others.

Ambient air and working area air:
- Ozone, nitrogen oxides, hydrogen sulfide, sulfur dioxide, carbon monoxide, hydrocarbon oil (C12-C19), hydrocarbons (methane), methane, methyl mercaptan, ethyl mercaptan, phenol, formaldehyde, synoptic parameters, and others.

Production premises in the companies (at workplaces)
- Noise, vibration, light, electric field strength, magnetic flux density, the electromagnetic field strength of industrial frequency, electrostatic field intensity.

Soils (soil, bottom sediments):
- Sampling, size composition, pH of the aqueous extract, carbonates, bicarbonates, sulfates, chlorides, nitrates, calcium, potassium, sodium, magnesium, hydrogen sulfide, petroleum products (hydrocarbons), phenol and phenol derivatives, organic chlorine pesticides, PCBs and heavy metals, polycyclic aromatic hydrocarbons (PAHs), gamma-emitting radionuclides.

Production and consumption waste, wastewater sludge, cuttings, activated sludge:
- Sampling, Morphological composition, Total content of sulphur
- Phenol and phenol derivatives, Formaldehyde, Benzene and toluene
- Cyanides (including cyanide complex compounds), Petroleum products
- Anionic surface active agent, Metals, Organochlorine pesticide
- Polychlorinated biphenyls, etc.
KAPE LLC Hydrobiological Laboratory TOO is accredited in 2015 for compliance with ST RK ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories by NTSA LLP.

Certificate of Accreditation: No. KZ.I.02.1661 dated 03.11.2015.

Scope of accreditation includes:

1. Sampling of surface water, bottom sediments and soil.
2. Determining the following indicators:
   - Phytoplankton,
   - Zooplankton,
   - Macrozoobenthos - taxonomic composition, abundance, biomass;
   - Fish - taxonomic structure, dimensions, weight

Work to be performed:

- «State environmental monitoring in the Caspian Sea shelf;
- «Assessing the biological resources status in the Kazakhstani sector of the Caspian Sea;
- «Analysing the impact of the hydrological regime and entry of toxicants across transboundary rivers Irtysch, Ili, Syr Darya, Tobol, Ishim, Shu and Talas on the formation of the biological resource status …

Orders under contracts of oil companies, such as Agip KCO, Caspian Meruerty Operating Company B.V., Kurmangazy Petroleum, KazTransOil and others are implemented.
GROUNDWATER MONITORING

The Company performs a full range of work relating to groundwater monitoring, including the drilling of monitoring wells, development of industrial environmental monitoring programs for groundwater, management and reporting on groundwater monitoring, maintenance and repair, and the elimination of monitoring wells.

The Company has a successful experience in drilling operations for such companies as: MangystauMunaiGas JSC, KaraZhanbas JSC, Agip KCO in Atyrau and Mangystau regions.

The Company has developed groundwater monitoring programs and implemented monitoring for more than 10 companies, among which are: KarazhanbasMunay JSC, MangystauMunayGas JSC, Emir-Oil LLP, EmbaMunayGas LLP, OzenMunayGas LLP, Ecogeoneftegaz LLP, Samek International LLP, Agip KCO Onshore Facilities in Mangystau and Atyrau Regions, Tengizchevroil LLP, Buzachi-Oil LLP.
Our Company is equipped with full range of certified instruments for measuring physical impacts: noise, ultrasound, infrasound, vibration, illumination, microclimate, EM-radiation and gamma radiation.

All these instruments are available in the Accredited Mobile Environmental Laboratory.

**Completed projects:**
Mandatory periodic certification of industrial facilities on labor conditions for companies:
- NCOC N.V., INKAI, JV, LLP
- JTI Kazakhstan, LLP
- KAZGOR Project Academy
- Medical emergency hospital, RSE on REM, Almaty
- Halyk Kazteleport, JSC, and others
- Inventory of harmful physical impacts on the ambient air, and permissible physical impact standards project for Eurasian Energy Corporation, JSC.
- Monitoring of physical impacts for Karachaganak Petroleum Operating Company’s facilities.
WTAER RESOURCES PROTECTION

Types of work:

✓ Maximum permissible discharges (MPD) standards projects:
  ❖ Discharges to water bodies:
  ❖ Discharges to holding lagoons:
  ❖ Discharges onto the terrain:

✓ Developing water resources protection and impact assessment sections in the Pre-EIA / EIA / EP sections Projects. Orders for more than 60 companies have been accomplished.

✓ Environmental audit. Assessing water protection activities in the companies during the audit.

✓ Developing specific water use standards

✓ Production monitoring of water resources.


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ASSESSMENT AND FORECASTING OF WATER RESOURCES

comprehensive scientific and research and practical work in the field of review of quantitative and qualitative indicators of surface and groundwater, possibility of their use in the industries of Kazakhstan.

• Hydrological surveys

  – More than 9 projects of the Ministry of Environmental Protection of the Republic of Kazakhstan medium CVR MSH, Akimats of Atyrau, Kyzylorda, Aktobe and East Kazakhstan regions have been accomplished.

• Hydrochemical and hydrobiological surveys:

  – Analysis of the impact of the hydrological regime and entry of toxicants across transboundary rivers Irtysh, Ili, Syr Darya, Ural and Emel Tobol, Yessil, Shu and Talas on the generation and status of biological resources in water reservoirs ... “(2011-2015), Customer – RoK KVR MSH.
To address tasks related to emergencies of water nature, the Company uses special **software packages**:

**MIKE 11** – is used to simulate the flood zones, GTA effects, the breakthrough of dams, and flood forecasting in a complex system of rivers and canals.

**MIKE 21** – is used to simulate flows, waves, contaminant transportation, and water quality in open water areas, estuaries and coastal sea areas.

**MIKE FLOOD** – is used to simulate flooding maps, GTA effects, flows, waves, contaminants transportation in open water bodies and systems of rivers and canals. It combines the advantages of one-dimensional and two-dimensional technologies.

**MIKE SHE** - is used to analyze, forecast and manage water resources at the joint consideration of hydrological processes in underground and surface water.

This software is developed by DHI Water & Environment (Danish Hydraulic Institute) - the world’s leader of this type of software. KAPE specialists have been trained in modeling in MIKE by DHI and have relevant certificates.

The combination of results of model calculation made by **MIKE FLOOD** with GIS technology enables to obtain the depth map, areas and duration of flooding in the territory, and to obtain comparative analysis of the map. **MIKE FLOOD capacities** enable to generate flood maps corresponding to different periods of recurrence of flood events.
GEOINFORMATION SYSTEMS (GIS)

Major work areas:

1. **Producing digital maps and spatial data:**
   - Collecting and processing of spatial data (space, radar, stereo, multispectral, aero-laser, stereo-spectral, ground-topographic and geodetic);
   - Analyzing and interpreting of geospatial data;
   - Production of analytical, evaluation and forecast thematic maps;
   - Selection, ordering and interpretation of aerial and satellite imagery.

2. **3D modeling:**
   - Developing digital models of terrain (DMT);
   - Developing digital elevation models (DEM);
   - Modeling based on the data from space and aerial shooting;
   - Thematic mapping based on 3D data analysis.

3. **City, land plots and invest maps:**
   - Creation and integration of different types and purposes GIS databases;
   - Creation and development of portals and geoportals to manage urban environment and infrastructure;
   - Development of land-use management systems in the agricultural sector of districts and regions;
   - Development of electronic databases of administrative regions with detailed elaboration to concrete addresses.

4. **Infrastructure and operational GIS:**
   - Creation of integrated GIS databases for integrated automation systems and dispatching control;
   - Development of record keeping systems and certification of technology infrastructure distributed facilities.
UNMANNED AIRCRAFT SYSTEMS (UAS) AND AERIAL WORK

UAS system allows to carry out aerial work round the clock in a wide range of weather conditions. The high level of flexibility and the ability to perform the tasks set is ensured due to the latest generation technologies.

FLIGHT AND SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
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<tbody>
<tr>
<td>Endurance</td>
<td>up to 4 h</td>
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<tr>
<td>Flight speed</td>
<td>65 ÷ 120 km/h</td>
</tr>
<tr>
<td>Maximum flight range</td>
<td>240 km</td>
</tr>
<tr>
<td>Takeoff weight</td>
<td>9.5 – 11.5 kg</td>
</tr>
<tr>
<td>Payload</td>
<td>2.5 kg</td>
</tr>
<tr>
<td>Wing span</td>
<td>3.2 m</td>
</tr>
<tr>
<td>Maximum flight altitude</td>
<td>up to 3600 m</td>
</tr>
</tbody>
</table>

UAS provides a designated equipment unit for fixed and hydro stabilised platforms in 2-D and 3-D planes.

Camera: a full-size CMOS matrix 24 Mpix, Kit of interchangeable lenses.

Video camera: HD-video camera 1080 × 1020 pix, 1-10 times optical zoom.

Optionally the following can be installed: night camera, multispectral cameras, system for automatic object tracking.
The **UAS** can be set to accommodate additional equipment: Thermal imager (IF camera), night camera, multi-spectral cameras, automatic tracking system. These options extend the capacities of the UAS and allow to produce:

- Shooting of industrial and transport objects in infrared range including control of accidental releases;
- Monitoring of linear objects (pipelines, power lines, highways and railways);
- Monitoring of status of infrastructure objects (buildings, bridges, crossings);
- Shooting of mud flow areas and slopes
Use of unmanned aircraft system (UAS)

1. Video and aerial shooting and creation of a cartographic base;
2. Monitoring of landslide and mudflow processes, assessment of slope status
3. Assessment of impacts from hydraulic accidents, dam failure and flooding;
4. Detection of fire at the incipient stage, fire propagation paths;
5. Search for missing people and groups.
Surveying work

IMPLEMENTING SURVEYS:

- Establishing support and survey geodetic networks;
- Implementing topographic and designated surveys;
- GNSS survey.
  - Horizontal and vertical survey: Trimble R7 GNSS (Static, Kinematic, RTK);
- Tacheometric survey:
  - Measuring horizontal and vertical angles, distances, and determining the values of their functions: Leica TC 403;
- Trace-sequential work:
  - Searching and mapping utilities that are located in the ground (water, gas, oil pipelines, cables, collectors, hidden hatches);
- Field, laboratory processing of survey data.
GEOPYSICAL SURVEYS

GEOLOGICAL SURVEYS:
• A detailed survey of geological structures to a depth up to 40 m.;
• Mapping of the bedrock foundation’s roof;
• Identifying weakened zones and areas in places of road and communications laying;
• Survey of landslides.

HYDROGEOLOGICAL SURVEYS:
• Survey of the hydrogeological structures of sites;
• Determining the level of groundwater occurrence up to 40 m depth;
• Determining the roof of local water-resistant sediments.
GEOPHYSICAL SURVEYS

DIAGNOSIS AND MONITORING OF ENGINEERING STRUCTURES STATUS:
• Surveying and monitoring of the road and railway embankments status;
• surveying hydraulic structures of all types and classes;

GEOECOLOGICAL AND ARCHAEOLOGICAL SURVEYS:
• Detecting historical and modern burials of environmentally hazardous wastes, hidden polygons;
• Identifying leaks from underground pipelines, ash and slag lines;
• Archaeological surveys.

EQUIPMENT AND SOFTWARE
• Georadar system ‘MALA Geoscience’ (Sweden) with a full set of antenna blocks;
• Processing software REFLEXW-2D-3D, GPR-Expert;
• Multielectrode survey electric station ‘SKALA-48’ (Russia) - Software: RES2DINV, RES3DINV;
• Multichannel seismic survey engineering station ‘Lakkolit XM-3’ (Russia) - Software: RadExPro;
• Electromagnetic induction meter ‘EMP-400 GSSI» (U.S.A.);
• Electromagnetic profiling hardware ‘AEMP-14’ (Russia).
MAGNETOMETRIC, BATHYMETRIC AND SONAR LOCALIZATION SURVEYS

SCOPE OF SURVEY APPLICATION:
- Constructing sea ports, facilities, channels;
- Laying routes for vessels passage on the rivers and in the sea;
- Visual survey of underwater pipelines;
- Dredging and engineering operations in water areas;
- Surveying water reservoirs during construction, operation and reconstruction of hydraulic structures;
- Search of sunken vessels and constructions;

WORK SUPPORT
- The Company has a full set of equipment, the relevant software.
- Survey vessels and coastal support vessels (CSV) are used to perform work.

Magnetometric surveys
- are carried out in order to detect different man-made steel structures and objects on the sea bed surface or near the surface, to determining their coordinates, volumes and covered area.

Bathymetric surveys are carried out in order to determine
- sea / water reservoir depths parameters (map)
- morphology of the seabed, its characteristics, the thickness of sediment layers.

Instrumentation for surveys:
- Highly sensitive marine magnetometer Marine Magnetics Explorer;
- Bathymetry and hydrospace detection system C3D-LPM manufactured by Teledyne Benthos;
- High-precision sea positioning system TRIMBLE SPS461 GPS;
- Ship Motion Control; Motion sensor IMU-108 of Ship Motion Control production;
- Sound speed profiler to be used in water MiniSVP;
MAGNETOMETRIC AND BATHYMETRIC SURVEYS

Magnetometric surveys (MMS)

The main instrument during MMS is a highly sensitive marine magnetometer Explorer. The magnetometer is a device towed in the water column with a sensitive sensor and control unit located on a vessel.

Purpose of Magnetometer:
Searching metal containing objects on the seabed (pipelines, sunken constructions, vessels, and etc.), determining their size and approximate mass.

Bathymetric surveys (BS) and sonar detection

The main device during BS and sonar detection is a Bathymetry and Sonar System C3D-LPM. It is a combination of a multi-beam echo sounder and side-scanning sonar.

Bathymetry and Sonar System is designed for
- Survey of seabed at the depths of 2-500 meters
- Survey of complicated seabed relief and coastal line (port areas, airsheds, shipyards, etc).
- Bathymetric mapping of bottom sediments, seabed profiling during engineering surveys.
- Tracing of cables and pipelines
- Monitoring of dredging operations and earth work
- Searching abandoned wells.
- Searching of sunken objects of any shape on the seabed.

Objects on the seabed found with the use of side-scanning sonar
Ancillary equipment is used during bathymetry and sonar system operation,

**GPS Compass TRIMBLE SPS461**

GPS Compass is designed to obtain vessel heading values in real-time mode with high accuracy.

**Motion sensor IMU-108**

Motion sensor ensures highly accuracy in identifying a heel, different and vertical movement while moving a dynamic environment, in all weather conditions, for all facilities in a real time mode.

**Positioning system C-NAV 3050**

C-NAV is designed to obtain coordinates in a real-time mode with high precision.

**Profile recorder of sound velocity in water - MiniSVP**

Profiler recorder is designed for obtaining precise information of the velocity of sound in water in a vertical profile.
In 2014-15, our company held a GPR, bathymetric and magnetometric studies on paving the navigable channel “PRORVA” in the north-eastern part of the Caspian Sea.

Magnetometric surveys were performed in order to detect conserved wellheads and metal-containing constructions. Length of the survey area was 86 km away.

Georadar surveys were performed in order to visualize subsurface structures, which can not be identified using a magnetometer.

Bathymetric surveys were performed in order to indentify the morphology of the seabed, characteristics and potential obstructions. The length of the survey area was 15 km away.
Hydrological observations

**Current registration instrument**
**ADTP Nortek**

Designed to measure velocity and the direction of currents

**Measured values:**
- Flow velocity up to 10 m/s;
- Flow direction 0-360°;
- Depth of measurement up to 300m;
- Battery life with measurement interval of 10 minutes - 50 days.

**Current registration instrument**
**ADTP RDI-1200**

Designed to measure velocity and direction of currents.

**Measured values:**
- Current velocity up to 3.4 m/s;
- Current direction - 0-360°;
- Depth of measurement up to 200m;
- Battery life with measurement interval of every hour - 1 year.

**Grain Size Analyzer LISST 100X**

Designed to measure the size and concentrations of suspended particles in water

**Measurable values:**
- Particles size - 2.5-500 microns;
- Concentration - 1-750 mg/l;
- Depth of measurement up to 300m.
Hydrological observations

**Oceanographic Metering Skid**

**SeaGuard RCM**

Designed to collect information about velocity and direction of the sea currents, transparency, temperature, conductivity, oxygen content in water and turbidity.

Immersion depth - up to 300 m.

**Probe YSI EXO2**

Designed to measure the physical and chemical parameters of water:

**Measured parameters:**
- Oxygen saturation
- Conductivity
- Salinity
- Temperature
- pH
- Turbidity
- Nitrates
- Ammonium nitrogen
- Chlorides
- Rhodamine

**Depth of measurement** - up to 250 meters.
Photo and video shooting of underwater objects

*Remotely Operated Submersible Device Super GNOM*
Ensures determining of coordinates, sizes and location of underwater objects. Allows to monitor the behavior of fish, seals and invertebrates in their natural habitats

**Main features**
- Maximum operating depth - up to 150 m;
- Engines: 2 horizontal ones, 1 vertical and 2 lagged;
- Cruising speed - 4 knots;
- Capacity - 2 kg;
- Front camera - Sony Super HAD CCD 2 with 600 TVL resolution;
- Rear B/W camera;

**Additional options**
- manipulator;
- round view sonar
- the system to determine the size of the object
- hydroacoustic navigation system MicroNav,
Motor boats ‘Zodiak’, Leader 599

Passengers tracked UTVs MT-LB

Hovercraft ‘Mirage’ – 18 PG

Hovercrafts ‘Khivus, Mars’

Cross-country vehicle ‘Polaris’ Sportsman 6x6

12 Jeeps (Toyota Tundra, Surf.)
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