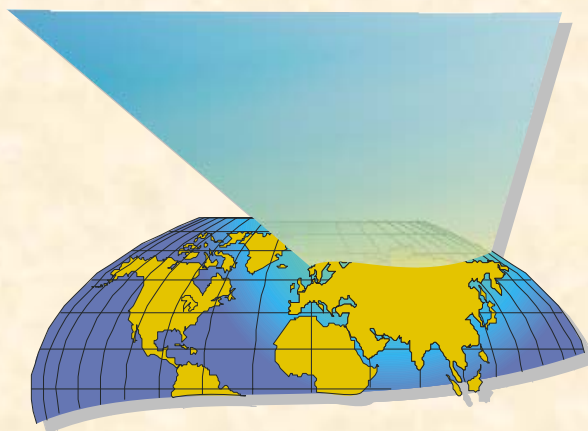


**RUSSIAN FEDERAL SERVICE for HYDROMETEOROLOGY and
ENVIRONMENTAL MONITORING**



**On the progress of implementation
of the Russian National AMAP Plan Projects (II stage)
by Roshydromet in 2003**

2003

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1. IMPLEMENTATION OF THE RUSSIAN NATIONAL AMAP PLAN PROJECTS (II STAGE) BY ROSHYDROMET IN 2003

In 2003 in the framework of the Russian National Plan and special projects, the research institutions of Roshydromet organized:

- complex studies during the seasonal expeditions;
- stationary systematic observations of atmospheric air pollution in the largest cities of the Russian Arctic (Murmansk, Monchegorsk, Vorkuta, Nickel, Amderma, Norilsk and Salekhard);
- observations of the levels of pollutants over the Roshydromet network points;
- complex studies and sampling within the framework of the joint PAIPON/AMAP/GEF Project: Persistent Toxic Substances, Food Security and Indigenous People of the Russian North.

1.1. Expedition studies

The expedition studies in 2003 were carried out in the western Arctic and included activity in the sea areas (Barents and Greenland Seas) and on the coast (Spitsbergen archipelago, Varandey settlement area, Novaya Zemlya archipelago, lower reach of the Pur River, lower reach of the Pechora River, areas of Nelmin Nos, Khatanga and Dudnka settlements).

A total of five Arctic expeditions were carried out by Roshydromet in 2003 that conducted sampling of different environmental media for the levels of pollutants.

The 2003 expedition areas are presented in Figure 1.

The scope of work and the characteristics of the information set obtained from the results of each expedition are given in Table 1. The same table contains explanation of abbreviations of the names of contaminant groups used below.

1.1.1. “Spitsbergen 2003” Expedition

In 2003, the ecological monitoring of the area of the Barentsburg miners' settlement on Spitsbergen archipelago was continued. The aim of the work was to specify the ecological situation with respect to pollution of environmental compartments. The surveys were performed in the framework of the Program of Roshydromet on the organization and development of scientific studies on the archipelago for 2002-2005, which is part of the “Comprehensive program for optimization and increase of efficiency of activity of the Russian organizations on the Spitsbergen archipelago” approved on January 14, 1999 by the Chairman of the Interagency Commission on Spitsbergen under the Ministry for Economical Development of the RF.

The work program included: geoecological sampling of atmospheric air and atmospheric aerosol, snow cover, soils, soil water and terrestrial vegetation in the settlement territory and in the sanitary-protection zone of the settlement and in the baseline areas; sea ice, seawater, seawater suspended matter and bottom sediments in the Gronfjord Bay area adjoining the settlement; freshwater ice, surface water and bottom sediments of potable water Lake Bienda-stemmev. The layout of ecological sampling points in the area of Barentsburg settlement included 9 ground, 6 marine and 1 lake-based sampling sites.

The samples collected during the surveys were investigated for the levels of organochlorines (OCs) including polychlorobiphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), oil hydrocarbons including total oil hydrocarbons (HY) and composition of the fraction of non-polar aliphatic hydrocarbons (NAH); individual phenols (alkyl-, chlorine- and nitro- derivatives), heavy metals and arsenic. The water samples were also examined for the levels of detergents. In addition, in samples of bottom sediments, the levels of detergents and nutrients were determined. The samples of atmospheric aerosols were examined for the levels of HM, OCs, PCBs and PAH, and in the air samples, the determinations of volatile organic compounds (VOC) and gaseous composition components: NO₂, SO₂, H₂S, CO, etc., were made.

The work was accomplished by the RC "Monitoring of the Arctic".

1.1.2. "Pechora Sea 2003" Expedition

During the winter-spring period 2003, 5 sub-ice water samples, 5 sea ice samples and 5 snow cover samples were collected in the Pechora Sea area at 5 marine stations.

In sea water samples, the hydrochemical indicators and concentrations of OH, HM, OCs (including PCBs) and PAH were determined. The ice and snow cover samples were investigated for the concentrations of OH, HM, OCs (including PCBs), PAH and mineral composition components.

The work with respect to chemical-analytical studies was accomplished by the RC "Monitoring of the Arctic".

1.1.3. "NAR-2003" Expedition

The work carried out in the framework of the "NAR 2003" expedition continued the activities undertaken in 1998-2002. The expedition period is September 2003. The study area was within the territory of the Varandey oil field.

The expedition work program envisaged:

- monitoring of pollution of atmospheric air, water and bottom sediments of land water bodies, soils and terrestrial vegetation;
- soil-botanical studies;
- visual and instrumental (aerial photography and video surveys) observations of disturbance of soil-vegetation cover.

Observations and sampling for chemical-analytical and other laboratory examinations were performed at 16 sampling points on land and at 12 sampling points in the area of tundra lakes.

The samples of water, bottom sediments and soils were examined for the levels of HM, total OH, non-polar aliphatic hydrocarbons, volatile aromatic hydrocarbons, PAHs, detergents and individual phenols (alkyl-, chlorine- and nitro- derivatives). Standard hydrochemical indicators were also determined in the water samples.

The samples of atmospheric aerosols were examined for the levels of HM, and PAH and the terrestrial vegetation samples – for the levels of HM and OH.

In the air samples, the determinations of volatile organic compounds (VOC) and gaseous composition components: NO₂, SO₂, H₂S, CO and O₃ were made.

The work was accomplished by the RC "Monitoring of the Arctic".

1.1.4. “Novaya Zemlya 2003” Expedition

During the 2003 summer period, sampling of land surface water on the west coast of Novaya Zemlya was carried out. A total of 61 samples of river and lake water were collected for determining the hydrochemical parameters and the concentrations of HM, OH, OCs, PCBs and PAH.

The work with respect to chemical-analytical studies was accomplished by the RC “Monitoring of the Arctic”.

1.1.5. “Urengoy 2003” Expedition

The expedition studies were carried out in August-October 2003 in the lower reach of the Pur River, including:

- monitoring of pollution of surface water and bottom sediments of land water bodies, soils and terrestrial vegetation;
- soil-botanical and hydrobiological studies;

Sampling of surface water and bottom sediments was carried out at 57 points located in the areas of the land water bodies. Sampling of soils and terrestrial vegetation was made at 159 ground-based sampling points. The water samples were examined for the levels of HM, OH and hydrochemical indicators; the bottom sediment samples – for the levels of HM, PCBs, OH and PAH. In soils, OH, PAH, PCBs and HM were determined; in terrestrial vegetation – HM; and in fish tissues – HM, OCs, PCBs and benzo(a)pyrene.

The work with respect to chemical-analytical studies was accomplished by the RC “Monitoring of the Arctic”.

1.1.6. “Arctic Rivers 2003” Expedition

In August-September 2003, sampling of river water, bottom sediments, soil and terrestrial vegetation was performed in the lower reach of the Pechora (Nelmin Nos settlement), Khatanga (Khatanga settlement) and Yenisey (Dudinka settlement) Rivers.

In each of the sampling areas, samples were collected at 5 ground sampling points and at 5 sampling points in the water area.

In the samples of water and bottom sediments, the determination of HM; OH; PAH; phenols, detergents and OCs (including PCBs) was carried out. In the soil samples, the levels of HM; OH; PAHs; OCs and PCBs were determined and in the vegetation samples - HM, PAH, OCs and PCBs.

The work was accomplished by the RC “Monitoring of the Arctic”.



Fig.1 Operation areas of Roshydromet expeditions in 2003 under the Projects

Table 1. Scope of work and characteristics of the information set obtained (planned) based on the results of Roshydromet expeditions in 2003

Study object / type of observations	Number of stations	Number of samples	Parameters under control
“Spitsbergen 2003” Expedition			
Seawater	12	30	H/Chem, DET, OH, PHE, VAH, PAH, HM, OCs, PCB
Sea water suspended matter	6	6	HM, OCs, PCB, PAH
Sea ice	3	3	HM, OCs, PCB, OH, PAH, PHE, SP
Sea bottom sediments	6	6	HM, OCs, PCB, OH, NAH, PAH, PHE, DET, nutrients, GMC
Surface land water	3	6	H/Chem, HM, OH, NAH, PAH, PHE, DET, OCs, PCB
Surface water suspended matter	2	4	HM, OCs, PCB, PAH
Freshwater ice	1		HM, OCs, PCB, OH, PAH, PHE, SP
Snow cover	8	8	HM, OCs, PCB, OH, PAH, PHE, MI, SP
Bottom sediments of fresh water bodies	2	2	HM, OCs, PCB, OH, NAH, PAH, PHE, GMC, nutrients, DET
Soils	8	16	HM, OCs, PCB, OH, PAH, NAH, VAH, PHE
Soil water	3	3	H/Chem, HM, OCs, PCB, OH, PAH, VAH, PHE, DET
Terrestrial vegetation	8	20	HM, OCs, PCB, PAH
Atmospheric aerosol	12	12	HM, OCs, PCB, PAH
Atmospheric air	12	12	VOC, NO ₂ , SO ₂ , H ₂ S, CO, O ₃
“Pechora Sea 2003” Expedition			
Sea water	5	5	nutrients, OH, PAH, HM, OCs, PCB
Snow cover	5	5	OH, PAH, HM, OCs, PCB, MI
Ice cover	5	5	OH, PAH, HM, OCs, PCB, MI
“NAR 2003” Expedition			
Surface land water	12	12	H/Chem, HM, OCs, PCB, OH, NAH, PAH, VAH, PHE, DET
Bottom sediments	12	12	HM, OH, VAH, PAH, OCs, PCB, PHE, GMC
Soils	16	16	HM, OH, VAH, PAH, OCs, PCB, PHE, GMC
Soil water	4	4	H/Chem, HM, OCs, PCB, OH, NAH, PAH, VAH, PHE, DET
Terrestrial vegetation	8	8	HM
Atmospheric aerosol	4	4	HM, PAH
Atmospheric air	4	4	VOC, NO ₂ , SO ₂ , H ₂ S, CO, O ₃
“Novaya Zemlya 2003” Expedition			
Surface land water	61	61	H/Chem, HM, OH, PAH, OCC, PCB
“Urengoy 2003” Expedition			
Surface land water	57	57	H/Chem, HM, OH
Bottom sediments	31	31	HM, OH, PAH, OCs, PCB
Fish	2	12	HM, OH, PAH, OCs, PCB
Soils	91	91	HM, OH, PAH, OCs, PCB, GMC
Terrestrial vegetation	91	91	HM
“Arctic Rivers 2003” Expedition			
Water	5	5	HM, OH, PAH, OCs, PCB, PHE, DET
Bottom sediments	5	5	HM, OH, PAH, OCs, PCB, PHE
Soils	5	5	HM, OH, PAH, OCs, PCB
Terrestrial vegetation	5	5	HM, OH, PAH, OCs, PCB

Notes:

H/Chem	- standard hydrochemical indicators (hydrogen index, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, redox potential, total alkalinity, nutrients, suspended matter)
HM	- heavy metals (Fe, Mn, Ni, Co, Cd, Pb, Zn, Cu, Sn, Cr, Hg, As)
OCs	- organochlorines (pentachlorobenzene, α - HCH, hexachlorobenzene, β - HCH, γ - HCH, heptachlor, aldrine, octachlorostyrene, heptachlorepoxyde, trans-chlordane, 2,4 - DDE, cis-chlordane, trans-nonachlor, 4,4 - DDE, 2,4 - DDD, 4,4 - DDD, cis-nonachlor, 2,4 - DDT, 4,4 - DDT, fotomirex, mirex)
PCBs	- polychlorinated biphenils (#28, #52, #101, #105, #118, #138, #153, #156, #180, sum of PCB)
OH	- oil hydrocarbons
PAH	- polycyclic aromatic hydrocarbons (naphthalene, acenaphthylene, biphenyl, 2-methylnaphthalene, 1-methylnaphthalene, fluorine, acenaphthene, phenanthrene, anthracene, 2,6-dimethylnaphthalene, fluoranthene, 2,3,5-trimethylnaphthalene, 1-methylphenanthrene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(e)pyrene, perylene, benzo(k)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, indeno(123cd)pyrene, benzo(g,h,i)perylene)
VAH	- volatile aromatic hydrocarbons (benzene, tholuene, orto-, para- and meta-xylene)
NAH	- non-polar aliphatic (C ₁₅ -C ₃₁)
VOC	- volatile organic compounds
PHE	- phenols
DET	- detergents
nutrients	- nutrients (nitrates, nitrites, ammonium, total nitrogen, phosphates, total phosphorus, dissolved silicates)
SC	- suspension concentration
SP	- solid particles
GMC	- granulometric composition
MI	- main ions (K, Na, Ca, Mg)

1.2. Stationary systematic observations of pollution of the atmospheric air and atmospheric precipitation

In 2003, the observations of the level of atmospheric air pollution in the cities of the Arctic zone were carried out at stationary posts in Murmansk, Nickel, Monchegorsk, Salekhard and Norilsk. Sampling was made daily (4 times a day) in equal 6 h time intervals at 1.00, 7.00, 13.00 and 19.00 hours Moscow time to the filters and adsorbing tubes. The following indicators were determined:

- in Norilsk - levels of dust, sulphur dioxide, carbone oxide, nitrogen dioxide, nitrogen oxide, formaldehyde, hydrogen sulphide, phenol, chlor, benzo(a)pyrene, heavy metals;
- in Murmansk - levels of dust, sulphur dioxide, carbone oxide, nitrogen dioxide, nitrogen oxide, formaldehyde, mercury, benzo(a)pyrene, heavy metals;
- in Monchegorsk - levels of dust, sulphur dioxide, carbone oxide, nitrogen dioxide, nitrogen oxide, formaldehyde, benzo(a)pyrene, heavy metals.

It should be noted that in connection with a difficult financial situation it was not possible for Roshydromet in 2003 to extend the scope of the observed parameters.

Monitoring of sulphur and nitrogen compounds in the air and atmospheric precipitation was continued, and besides, acidification of atmospheric precipitation was measured at the stations of atmospheric pollution control Yaniskosky (Kola peninsula) and Pinega (Arkhangelsk region) in the EMEP framework.

In 2003, observations were continued at the station of carbon dioxide monitoring system - Teriberka. Frequency of sampling under the programme was 4 times a month. Air samples were analyzed at the Voeykov Main Geophysical Observatory.

It should be noted that operational obtaining of data on CO₂ concentrations at Teriberka station is very difficult due to a considerable lack of finances, which reduces the operational character of data obtaining.

In 2003, observations of the chemical composition of atmospheric precipitation were carried out at 5 stations of the Arctic network of stationary observations, situated in the area of Krasnoshchelye settlement (Kola peninsula), Naryan-Mar (Pechora River), Dikson Island, Turuhansk (Yenisey River) and Kusyur settlement (Lena River). The work program envisages monthly collection of the integral sample of precipitation.

Since 1999 a joint Project with the NPO "Taifun" connected with using automated instruments of air sampling for the levels of pollutants is realized in Amderma settlement. Now the organizations of Roshydromet solve the problem of installing the sampling equipment for the levels of organic compounds of mercury.

1.3. Radiation monitoring in the Russian Arctic

In 2003, observations in the framework of planned work for control of radioactive contamination of environmental compartments were continued at 34 sites of the State System of Radiation Monitoring in the Russian Arctic.

At all stations daily monitoring of the exposure dose strength of gamma emission and daily sampling of radioactive fallout from the atmosphere are carried out to determine total beta-activity.

At the sites in Arkhangelsk, Naryan-Mar, Salekhard, Murmansk, Dikson island, Zhelaniya cape, Kheis island and Kandalaksha sampling of aerosoles in the surface atmospheric

layer and atmospheric precipitation was performed for a specific radioisotopic analysis, including determination of tritium. The analysis is being conducted at the laboratories of NPO "Taifun" and territorial administrations of Roshydromet in St.Petersburg and Yakutsk.

Samples of surface water for determination of levels of 90-Sr and tritium were collected at the stations of radioactive contamination control, located in the mouth regions of the largest rivers of the Russian Arctic (Severnaya Dvina, Pechora, Mezen, Ob, Yenisey, Khatanga, Lena and Indigirka). Besides, the control for levels of 90-Sr in sea water was conducted in the White and Barents Seas in the most significant regions of the water area.

List of stations of radioactive contamination control and types of radiometric observations performed at these stations are presented in Table 2.

1.4. Conclusion

In conclusion it is necessary to stress that in spite of a complicated situation with the financing of the Arctic studies, Roshydromet in 2003 continued sufficiently large-scale expedition studies and observations of the state of environment components over the stationary network. The collected samples were passed to the base chemical laboratories of the Regional Center "Monitoring of the Arctic", NPO "Taifun" and the Institute for global climate and ecology, where they were analyzed.

It is necessary to stress that a considerable amount of comprehensive data on the state of the ecosystems in the specific regions of the Arctic land and local sea water areas was obtained in the framework of contract work with the interested investors. In this connection these data can be made available to the AMAP Secretariat only in the generalized form.

Data on these regions for the specific samples and specimens could be transferred to the Secretariat only on a compensatory financial basis with agreement of the investors.

Table 2. List of radiation control points and types of radiometric observations

Point of observation	Synoptic index	Geographical coordinates		Observation type			Conduct of radiometric observations in situ
		latitude	longitude	G	P	AFE	
Coastal							
1. Nikel M	22004	69° 25'	30° 11'	+	*		
2. Ura-guba M	22018	69° 17'	32° 48'	+	*		
3. Dalniye Zelentsy M	22037	69° 07'	36° 04'	*	*		
4. Cape Svyatoy Nos M	22140	68° 08'	39° 46'	+	*		r/m
5. Intsy N	22452	65° 58'	40° 13'	*	*		
6. Kanin Nos N	22165	68° 39'	43° 18'	+	*		r/m
7. Tobseda N	23105	68° 33'	52° 15'	*	*		
8. Khodovarikha N	23103	68° 56'	53° 46'	+	*		
9. Chernaya N	23118	68° 00'	57° 25'	*	*		
10. Varandey N	23112	69° 49'	58° 01'	+	*		
11. Korotaikha A	23121	68° 46'	61° 26'	*	*		
12. Mezen N	22471	65° 52'	44° 13'	+	+		
13. Kem-port N	22522	64° 59'	34° 48'	+	+		
14. Severodvinsk N	22546	64° 35'	39° 47'	+	*	*	
15. Unskiy Mayak N	22541	64° 50'	38° 24'	+	*		
16. Kego N (Arkhangelsk)	22555	64° 32'	40° 28'	+	+	+	
17. Zimnegorskiy Mayak N	22446	65° 28'	39° 44'	*			
18. Mud'yug N	22551	64° 51'	40° 17'	+	*		
19. Zhizhgin N	22438	65° 12'	36° 49'	+			
20. Amderma A	23022	69° 46'	61° 41'	+	+	0	
21. Tiksi T	21824	71° 40'	128° 50'	+	+	*	
22. Pevek P	25051	69° 42'	170° 15'	+	*	*	
23. Krasnoarmeyskiy P	25055	69° 33'	172° 02'	0	0		r/m
Island							
24. Barentsburg M (Spitsbergen Island)	22107	78° 04'	14° 15'	+	+	*	r/m
25. Morzhovets Island N (White Sea)	22361	66° 43'	42° 29'	+	+		r/m
26. Bugrino N (Kolguev Island)	22193	68° 48'	49° 20'	+	+		r/m
27. Uedineniya Island TM	20274	77° 30'	82° 14'	0	0	0	0
28. Vrangal Island P	21982	70° 59'	178° 29'	+	0	0	0
29. Karmaguly A (Novaya Zemlya Island)		-	-	+	*	*	
30. Cape Zhelaniya TM (Novaya Zemlya Island)	20353	76° 57'	68° 33'	0	0	0	0
Observation points within a 100-km area of the Kola NPP							
31. Apatity M	22213	67° 33'	33° 21'		+	+	
32. Pulozero M	22119	68° 21'	33° 18'		+	*	
33. Umba M	22324	66° 40'	34° 20'		+	*	
34. Zasheek M	22214	67° 24'	32° 33'		+	+	

Note:

G	- measurement of exposure dose capacity	M	- Murmansk HMSA
P	- plane-table	N	- Northern HMSA
AFE	- air-filtering equipment	A	- Amderma HMSA
+	- ongoing measurements	T	- Tiksi HMSA
*	- planned observations	TM	- Taimyr HMSA
0	- to resume earlier interrupted observations	P	- Pevek HMSA
		HMSA	- Hydrometeorological Service Administration

2. JOINT GEF, AMAP, CIRCUMPOLAR ASSOCIATION OF THE INUITS AND ROSHYDROMET PROJECT "PERSISTENT TOXIC SUBSTANCES (PTS) AND FOOD SECURITY OF THE INDIGENOUS PEOPLE OF THE ARCTIC"

Beginning from 2000, realization of a multilateral international GEF/RAIPON/AMAP Project "Persistent Toxic Substances (PTS) and Food Security of the Indigenous People of the Russian North" began.

In 2003, the RC "Monitoring of the Arctic" and NPO "Taifun" carried out the work on implementing the following sub-projects:

- Study of biomagnification in the arctic food chains. Analysis of the samples of marine mammals, fish and weeds collected in the area of the Chukotka Peninsula during the 2002 summer-autumn season;
- Assessment of distant sources. Preliminary assessment of riverine fluxes as a source of PTS in the Russian Arctic. Calculation of PTS transfer through the closing and downstream cross-sections of the Pechora and Yenisey Rivers during the typical water regime phases;
- Monitoring of PTS levels in human tissues. Analytical determination of PTS levels in the samples of blood and food products

2.1. Sub-project: "Study of biomagnification in the arctic food chains. Analysis of the samples of marine mammals, fish and weeds collected in the Chukotka Peninsula area during the 2002 summer-autumn season"

The work program under the Sub-project envisaged analytical studies of the samples of organs and tissues of marine mammals, fish and also weeds that are most frequently used as food by the indigenous population of Chukotka, which were collected in the area of Lavrentiya and Uellen settlements on the Chukotka Peninsula:

- muscle tissue, fat, liver and kidney of marine mammals, including: the Pacific walrus (*Odobenus rosmarus*), ringed seal (*Phoca hispida*), bearded seal (*Erignathus barbatus*), larga sea (*Phoca largha*) and grey whale (*Eschrichtius gibbosus*);
- muscle tissue and liver of the local fish species, including: chum (*Oncorhynchus keta*), smelt (*Hypomesus olidus*), flounder (*Limanda aspera*), loach (*Salvelinus alpinus*).
- seaweeds (*Laminaria sp*);

In 2003, studies of 218 single specimens of tissues of marine mammals, 24 pulled specimens of fish tissues and 2 pulled samples of seaweeds were made.

The samples were analyzed for the levels of:

- halogeno-organic persistent compounds (organochlorine pesticides and their metabolites, PCBs, polychlorobenzenes, brominated biphenyls and diphenyl ethers);
- polycyclic aromatic hydrocarbons;
- heavy metals;
- chlorinated dibenzo-dioxins and dibenzo-furans.

The work was accomplished by the RC "Monitoring of the Arctic". In some types of the studies, the Bashkir Ecological Center was involved.

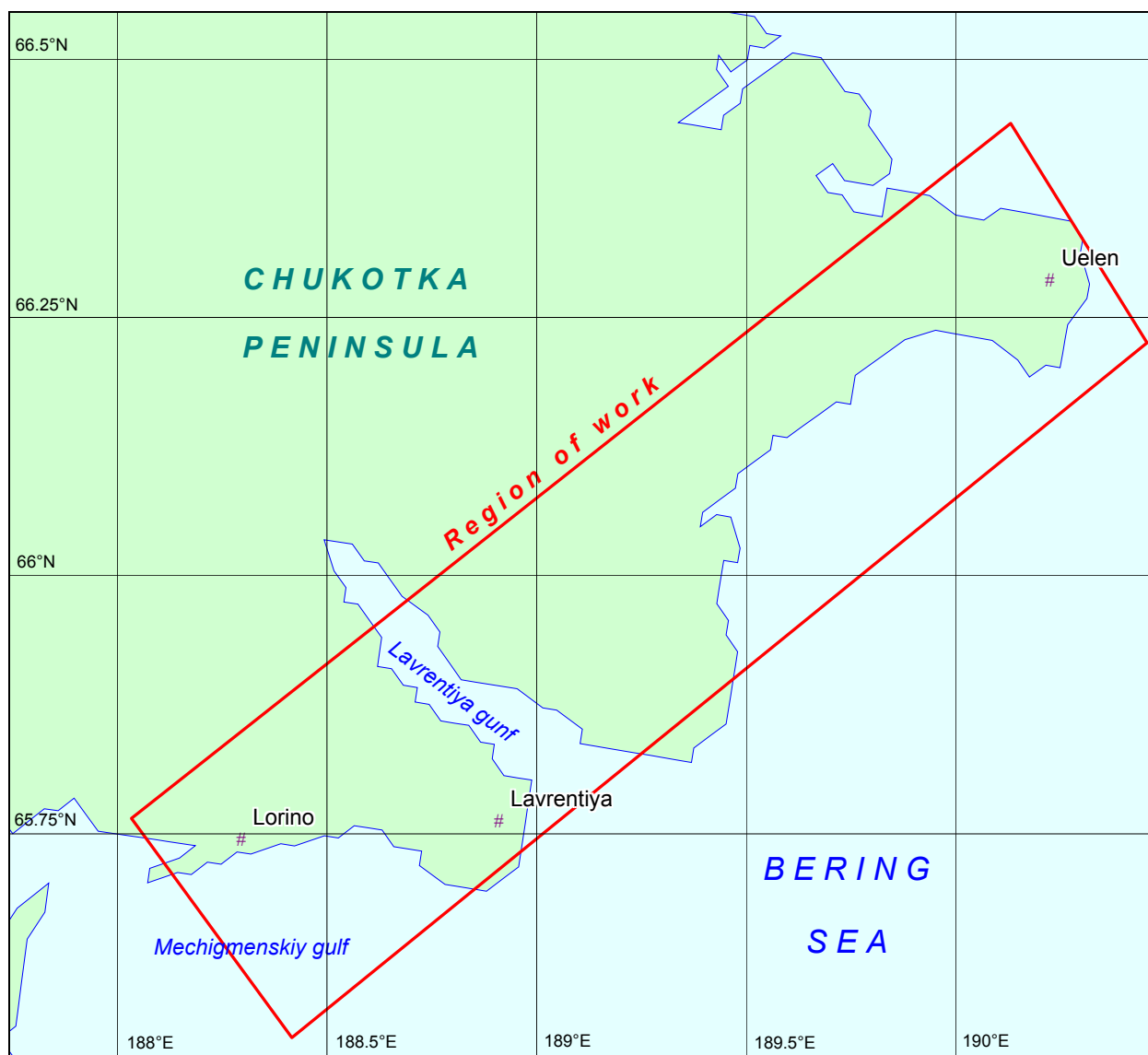


Fig. 2. Sampling areas on the Chukotka Peninsula

2.2. Sub-Project “Assessment of distant sources. Preliminary assessment of riverine fluxes as PTS source in the Russian Arctic. Calculation of the PTS fluxes through the closing and downstream cross-sections of the Pechora and Yenisey Rivers during the typical water regime phases”

In 2003, the aim of the study under the Sub-Project was to calculate the PTS fluxes through the closing and downstream cross-sections of the Pechora and Yenisey Rivers during the typical water regime phases (at the flood decrease, during the summer low water period, before the ice cover formation and during the winter low water period) and give a preliminary assessment of the total annual PTS fluxes in the lower reaches of these rivers.

The locations of the cross-sections, for which the calculations were performed, are shown in Figs. 3 and 4.

As initial data for calculation of PTS fluxes, the results of the hydrological observations at the cross-sections of the lower reaches of the Pechora and Yenisey Rivers and chemical-analytical studies of the water and suspended matter samples obtained in the framework of studies under the project in 2001-2003 were used.

The scope of work included:

- Calculation of mean daily PTS fluxes during the typical water regime phases:
 - For the closing cross-section of the Pechora River in the Oksino settlement area;
 - For the downstream cross-sections of the Pechora River in the Andeg settlement area;
 - For the closing cross-section of the Yenisey River in the Igarka area;
 - For the more downstream cross-section of the Yenisey River in the Ust'-Port settlement area;
- Assessment of the total annual PTS fluxes through the closing cross-section of the Pechora (Oksino area cross-section) and Yenisey (Igarka area cross-section) Rivers for the year of observations and for the average water content year;
- Assessment of the total PTS fluxes through the downstream cross-section of the Pechora (Andeg area cross-sections) and Yenisey (Ust'-Port area cross-section) Rivers for the year of observations;
- Brief analysis of the inter-annual variability of the water content of the Pechora and Yenisey Rivers based on data of long-term observations at the closing cross-sections;
- Quality control of calculations performed;
- Preparation of the Final Report.

The calculation was made for the following PTS List:

- organochlorine pesticides and their metabolites (HCH-isomers, DDT-isomers, polychlorocyclodienes, individual chloro-biphenyls, chlorobenzenes, toxaphenes)
- polycyclic aromatic hydrocarbons
- heavy metals.

The work under the Sub-Project was accomplished by the RC “Monitoring of the Arctic”.



Fig. 3 Location of hydrometric cross-sections in the Pechora River



Fig. 4 Location of hydrometric cross-sections in the Yenisey River

2.3. Sub-Project “Monitoring of the PTS levels in human tissues. Analytical determination of the PTS levels in the samples of blood and food products”

The aim of the Sub-Project was to investigate the levels of PTS in the samples of whole blood, blood serum and plasma, female breast milk of the representatives of the indigenous peoples of the Russian North.

In addition to the samples of human blood, the levels of PTS in the framework of this Sub-Project were also investigated in the samples of food products after their thermal treatment, washouts and scrapes from the surface of walls and furniture of the living premises and in the specimens of domestic insecticides used by the population.

Sampling of human bio-media and collection of other types of samples were made by the personnel of the North-West Center of Hygiene and Public Health of the Ministry of Health of the RF.

In total in the framework of the Sub-Project, studies of more than 1000 of all types of samples were carried out.

Besides the PTS proper (persistent organic compounds, heavy metals and selenium), the samples of human bio-media were additionally studied for the levels of ferritin and lipids.

The work under the Sub-Project was accomplished by the NPO “Taifun” and the RC “Monitoring of the Arctic”.