ANNEX III

STEERING COMMITTEE

UNEP/GEF Project - Russian Federation – Support to the National Programme of Action for the Protection of the Arctic Marine Environment

Third Meeting

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Progress Report on Implementation of BASES-Demo project

Prepared by:	Project Office
Status:	Approved

This report presents the results of the survey of the state of the area of decommissioned sites of the Russian Federation Ministry of Defense and demonstration work to remediate the environment of the area of decommissioned site on Alexandra Islands of Franz Josef Land Archipelago.

Work is based on Contract No. CS-NPA-Arctic-1/2007 of August 29, 2007 between Non-Commercial Organization Foundation of Polar Research "POLAR FOUNDATION" (NCO "POLAR FOUNDATION") and Institution "National Pollution Abatement Facility Executive Directorate" ("NPAF Executive Directorate") "Environmental Remediation of the Decommissioned Military Base on Franz Josef Land Archipelago".

The survey was agreed with the Ministry of Defense and Rosprirodnadzor Administration for Arkhangelsk Region.

The goal of work was as follows:

1. Reconnaissance of the present environmental state of the part of area of decommissioned site of the Russian Federation Ministry of Defense on Alexandra Island including assessment of man-made degradation and levels of soil contamination to determine the scope and composition of work on reclamation and remediation of the area.

2. Pilot work on the demonstration area cleanup on the area of the decommissioned military base Nagurskaya.

3. Pilot work on of the demonstration area remediation on the area of the decommissioned military base Nagurskaya the use of biological products.

4. Determination of legal and organizational procedures of the release of the contaminated areas from the Russian Federation Ministry of Defense responsibility.

5. Development of guidelines on the remediation of contaminated areas of decommissioned military sites in the Russian Arctic.

Non-Profit Organization Foundation of Polar Research "POLAR FOUNDATION" is the Contractor.

State Institution "State Oceanographic Institute SOI" (management of expeditionary work), LLC "I.K.M. Engineering", Saint-Petersburg and North-West Branch of SPA "Typhoon", Saint-Petersburg were involved as Subcontractors.

Field work was performed during the cruise of the Northern Hydrometeorological Service Administration's Research Vessel "Mikhail Somov" supplying polar stations and researches within the 2007/2008 International Polar Year Program and in the period of survey work on Alexandra Island in September-October, 2008. .

Field work and laboratory researches were based on applicable regulatory documents regulating the requirements to observations, sampling and analysis procedure.

Present state of man-made degradation of Alexandra Island

Three main regions of man-made degradation were selected on the island to conduct aerial and terrestrial survey.

Area	No. of site of land survey	Surveyed territory size km^2	Description
Alexandra Island	1	0.2	Oil and lubricant storage facility in Severnaya Bay
	9	2.9	Radar station (air defense radar post, oil and lubricant storage facility)
	10		Oil and lubricant storage facility, settlement of Nagurskoe
Total:	**3**	**3.1**	

Site 01. The site is situated on the Severnaya Bay coast near the berth on which the equipment is disembarked from water crafts. There a lot of tanks and metal drums at the area. Some tanks are now used as oil and lubricants storage facility. The drums have labels of the 50's and 80's. The drums having labels of the 50's are empty; those of the 80's are partially full of oil and lubricants.

Site 09. Several facilities having the name "Radar station", since the ruined radar facilities are the most typical structures. According to information from the helicopter crew, there was an air defense post there. The hydrometeorological station was situated near the post; however, no typical meteorological area was found there. There are several abandoned structures (one of them has a sign "ДЭС-2", wooden elevated road, tanks the content and degree of fullness of which could not be determined. The area is littered with waste metal structures and other wastes. There are a lot of traces of oil pollution on the thawed soil.

Site 10. Oil and lubricants storage facility near the settlement of Nagurskoe (the test site of drums cleanup and pollution consequences, at which the experimental work was performed under the demonstration project on the environmental remediation on the area of the decommissioned military site, see section 6).

Reconnaissance survey of the current environmental state of the areas of decommissioned sites of the Russian Federation Ministry of Defense on Hoffman, Graham Bell and Alexandra Islands of Franz Josef Land Archipelago allows us to make an unambiguous conclusion on a significant level soil contamination and degradation at the area under study.

On Alexandra Island, 2.55 sq. km (82 percent) of 3.1 sq. km of the surveyed area man-made degradation are littered and suffer man-made degradation of soil and vegetation cover due to organized and non-organized vehicle traffic.

Most area covered by observation is littered with iron drums with the density from 10 to 30 pieces per hectare. The area affected by this type of contamination amounted to 3.1 sq. km on Alexandra Island

On the surveyed area, there are many ruins of technical and general purpose buildings and structures; dumps of metal scrap and domestic and construction waste; abandoned vehicles, radar stations, tanks, cisterns with oil and lubricants on racks and even aircrafts. The number of these detected and geocoded objects is 258, including

Building, technical and general purpose structure- 55
Rack with oil and lubricant cisterns - 18 (194 cisterns)
Reservoir, cistern -15
Stack of 200 l drums of oil and lubricants - 42
Dump of drums - 38

Radar station	- 1
Vehicle	- 12
Watercraft	- 1
Aircraft	- 1
Wooden rack	- 2
Power line	- 14 sectors (5 km)
Industrial, construction and domestic waste dump	- 34 (125.2 thousand sq m)
Construction material and equipment storage yard	- 5
Traffic lane for vehicles	- 16 sectors (6.7 km)

It should be taking into account that reconnaissance survey was performed in autumn in the initial phase of snow cover formation, that is why even for the surveyed territories the man-made disturbed areas are significantly larger in size than the above, and with account of non-surveyed areas are multiple larger than those presented in this report.

This is also completely true for the number of geocoded objects.

The study of soil quality based on Rospotrebnadzor normative documents SanPiN 2.1.7.1287-03, GN 2.1.7.2041-06 and GN 2.1.7.2042-06 allows to classify the level of contamination at all sites of geoecological testing on Alexandra Island as **hazardous and extra-hazardous**.

The assessment according to international standards (Neue Niederlandische Liste) showed that the contamination with oil products at the sites of testing 2-6 times exceeds the intervention level, while the average total content of polycyclic aromatic hydrocarbons 2-8 times exceeds the allowable concentration.

The results of the study of the technical liquids showed that none of the specimens is a product based on organochlorine compound; the total content of PCBs in all samples did not exceed several hundreds of micrograms per kilogram of the product. Such a level of the content of organochlorine compounds is allowable for oil and can be explained by the pollution of oil products during their production, canning, transportation and long-term storage.

Even an accidental spill of these oil products cannot cause hazardous soil contamination with of organochlorine compounds. It is confirmed the levels of PCB content in soil specimens (maximum – 12 allowable concentrations, 0.24 mg/kg), not reaching the intervention level (1.0 mg/kg) in any soil samples even in the most contaminated with spilled oil products. At the same time, the petroleum hydrocarbon content multiply exceeds the intervention level. The analysis of the results has not revealed any similarity of the qualitative PCB composition in contaminated soils with that contained in technical liquids stored in the vicinity of the same site. This shows the presence of different sources of soil contamination both local (release of PCB-containing paint chips from drum and rank surfaces due to corrosion) and associated with PCB intake with atmospheric precipitation and dry precipitation due to long-distance atmospheric transport in the period of their large-scale production.

Environmental remediation on the area of the decommissioned military base Nagurskaya

Demonstration work on collection and disposal of empty drums with oil and lubricant residues and cleanup of soil from oil and lubricant residues with the use of biological products decomposing these pollutants was conducted on the area of the decommissioned military base Nagurskaya on Alexandra Island. Work was conducted from September 18 to

20 without regard to the time of loading and unloading of equipment). Delivery and evacuation of equipment and team of specialists was conducted with the use of Northern Hydrometeorological Service Administration's Research Vessel "Mikhail Somov".

Three test sites were selected to implement the demonstration project, however, the areas of test sites 2 and 3 only were cleaned up due to the impossibility to work on the test site 1 (oil and lubricant drums are itemized on the balance sheet of the frontier post).

Test sites 2 and 3 are situated on site 10.

The work layout included the following:

- clean up of the demonstration site from waste metal;
- collection of empty and partially filled with oil and lubricant residues drums from one or several sites (the total area is not more than 1 ha);
- oil and lubricant residues drainage into the cisterns available on the area;
- cleanup of the drums with a special equipment providing the cleaning fluid regeneration;
- compaction of empty drums;
- packaging of compacted drums, delivery by Research Vessel "Mikhail Somov" and transfer of waste metal to a waste metal disposal organization;
- treatment of cleaned areas with cultivator;
- introduction of two types of biological products decomposing organic pollutants on cleaned areas.

After the selection of trial cleanup sites, oil and lubricant drums were removed from the sites and compacted in trial mode with the use of a special hydraulic press with a pressure of 12 tons, control soil samples were collected from the areas to be cleaned up with biological products and two different commercial biological products Devouroil and Petrotreat and biogenic matters required for their use were introduced on these sites. A part of areas treated with the biological products were covered with special films to provide a better thermal regime for the biological products. A small number of compacted and non-compacted oil and lubricant drums were transported to Arkhangelsk by Research Vessel "Mikhail Somov" after the completion of work

The following main problems were defined during the execution of work:

High power pressing or compacting equipment is required to compact most drums since the thickness of drum walls may reach 2 mm.

The drums should be washed and recycling water cleaned up in a room with positive temperature since the drums are full of a frozen mixture of oil and lubricant residues and water.

The control survey was performed in October, 2008 during the expedition for additional study of the site territory on Alexandra Island. The samples were analyzed in a laboratory of N.N.Zubov SOI.

Averaged values for test site 2 points 45 – 48 and 65 and test site 3 points 58 – 60 are given in Table 1.

Table 1.

TABLE OF AVERAGED VALUES OF PETROLEUM HYDROCARBONS CONTENT IN SOILS OF TEST SITES IN 2007 AND 2008

YEAR	Test Site 2	Test Site 3
2007	3540	19150
2008	800	6130

The above table shows that concentration of petroleum hydrocarbons decreased in 2008 in comparison to 2007 by 4.5 times and at test site 2 and by 3 times at test site 3.

Apparently 1.5 times higher decrease in contamination level was due to the effect of the biological products. At the same time having such representativeness of results a 1.5 times difference may be considered insignificant.

Following the results of the experiments on soil cleanup using the biological products, the main conclusions are as follows:

- Biological products decreasing the soil contamination level should be used at the sites having high local soil contamination with petroleum hydrocarbons provided that it can be guaranteed a high effect of biological products, i.e. such areas should be defended either with natural obstacles or artificial borders to avoid washout of biological products and biogenic matters introduced on these sites
- Biological products should be introduced in the beginning of the warm season if possible to provide the maximum possible time of action.
- To increase the effectiveness of the biological products application, various covers should be used such as special films or stationary polycarbonate greenhouses to provide the maximum possible soil warming.
- Special and apparently small in area test areas can be established where, taking into account all above activities, contaminated soils collected from other sites and delivered to the test site can be biologically cleaned up.
- It is preferable to use specialized biological products adapted to the maximum to the use in the Far North. Biological base of such products should be microorganisms cultivated from the strains bacteria which are natural biodestructors of petroleum hydrocarbons in soils of Transpolar regions.

Legal and organizational procedures for the release of cleaned up areas from the RF Ministry of Defense responsibility

In the exercise of the functions of armed protection, integrity and inviolability of the territory of the Russian Federation, land plots can be used by the military forces for construction, preparation and maintenance of readiness. This land plots are federally owned. The cannot be transferred to private ownership of physical or legal persons and they cannot be deal objects under Civil Law. This legal provision is simultaneously stated in the Land Code of the Russian Federation and Federal Law No. 61-FZ "On Defense" (article 1, item 10). The Ministry of Defense implements these legal provisions through a set of effective departmental regulatory acts of the Ministry of Defense one of the main one of which is 1977 Minister of Defense order No. 75 "On Apartment Management and Housing Allowance of the Soviet Army and Naval Forces" (with amendments of June 26, 2000).

Land plots for Ministry of Defense needs are offered for unlimited or temporary use (on the basis of operational management).

After the lands are not needed they are returned by means of their release from the "defense and security land" category in accordance with the RF Land Code and further used in accordance with the RF Government an RF subdivisions resolutions.

In order to implement the resolution on the build-up of military potential in the Far North, based on the applications made by the Ministry of Defense, the land given below allotment was authorized be the Arkhangelsk Region Executive Committee of the USSR for deployment;of military units on Franz Josef Land Alexandra Island:

Alexandra Island, Primetny	- for technical purposes of m/u 09436 (m/u 03219), - **10,0** ha;
Alexandra Island, Site 505 Nagurskaya	- for deployment of military post m/u 09436 (m/u 03219), - **20,0** ha.
Alexandra Island, Nagurskaya *	- for deployment of military post m/u 09436 (m/u 03219), - **23,0** ha;

These plots were used by the Ministry of Defense in accordance with their intentions till the early 90's of last century.

The 1990's Armed Forces' reforms contributed to the reduction of military units deployed in the Arctic region including military unit 09436 (m/u 03219). At the same time, this military unit property, weapons and military hardware reached their service life as well as and wastes of various classes of hazard could not be removed due to the high cost of their removal, absence of the Ministry of Defense's ice-class vessels and appropriate mooring facilities on these islands. Abandoned barracks and quarters of military unit 09436 (m/u 03219) also reached their service life and were taken off the books. Until now the land plots have not been transferred to the balance sheet of the Arkhangelsk Region executive authority.

Due to a further absence of demand for these land plots on Franz Josef Land the RF Government organized their commercialization. In this context, the RF Government adopted by its Decree No 571-p of April, 1994 a RF Ministry of Natural Resources proposal on the establishment of the Ministry of Natural Resources' federal nature reserve Franz Josef Land.

The requirements of the RF Government Decree are the basis to start work on releasing the land plots transferred earlier to the RF Ministry of Defense situated on Franz Josef Land from the "defense and security land" category.

In accordance with the RF Ministry of Defense procedures, applications to change the target purpose of the land plots situated on Alexandra Island (release from the "defense and security land" category) are made by the Chief of the RF Ministry of Defense Billeting, Facilities and Installation Service.

The needed documents and the above applications are prepared by the Air Force General Headquarters which will be submitted for signing by the Chief of the RF Ministry of Defense Billeting, Facilities and Installation Service through the RF Ministry of Defense General Apartment Management Administration. The Air Force Commander-in-Chief appoints the respective commission to obtain needed concurrence with interested military command structures and organizations preparing the appropriate materials.

Conclusions

Reconnaissance survey of the current environmental state of the area of the decommissioned site of the Russian Federation Ministry of Defense on Alexandra Island of

Franz Josef Land Archipelago allows us to make an unambiguous conclusion on a significant level of soil contamination and degradation at the area under study.

Man-made degradation of the territory is mainly represented by four types.

First – organized (stored) and non-organized accumulation of drums and cisterns (empty and full of oil and lubricants) on the coast, near the frontier post Nagurskaya, in vicinity of abandoned military base as well as along the road from the coast (anchorage for vessels) to the frontier post Nagurskaya.

Second – abandoned military, transport and other equipment in vicinity of the decommissioned military site. Some abandoned equipment contains technical liquids containing PCB and heavy metal.

Third – damaged pipelines from the coast (anchorage for vessels) to the frontier post Nagurskaya and to the decommissioned military site.

Forth – ruins of structures of the former frontier post Nagurskaya, decommissioned military site, construction and domestic waste.

The level of contamination at all sites of geoecological testing on Alexandra Island can be regarded as extra-hazardous.

The results of the demonstration project on cleanup of the area from empty drums with oil and lubricant residues showed the following:

- Equipment with pressing force of at least 24 tons should be used for compacting drums;
- Oil and lubricant residues should be either burnt in incinerators to clean up the drums from oil and lubricant residues for preventing environmental pollution or the drums should be washed in a specially equipped room at a positive temperature;
- Soil reclamation on Alexandra Island is highly difficult due to a large number of stones and absence of soil cover as such. In the course of cleanup soil can be treated to reach the state close to that in non-degraded areas of the island;
- Taking into consideration the geographical situation of the sites location, work should be carried out in the period of maximum positive temperatures, e.g. in August and the first decade of September.

The experience of implementation of the demonstration project showed that during implementation of a full-scale project on remediation of the area of decommissioned sites of the Russian Federation Ministry of Defense in high-altitude Arctic region, specialized and possibly unique process layout should be used, especially for disposal of hazard and extra-hazard wastes and further remediation of degraded lands.

So a series of pilot projects to develop various technical solutions are to be implemented along with the development of a full-scale project on remediation of the area in high-altitude Arctic region.

In conclusion, it can be noted that 2007-2008 experimental project on survey and cleanup of the area of decommissioned sites of the Russian Federation Ministry of Defense on Alexandra Island has resulted in obtaining a large amount of unique information and working out the components of the procedures that can be used for planning and performance of further work on cleanup of the area of this site and similar ones. For organizational, resources' and engineering support of further work on cleanup of contaminated areas of the archipelago, close cooperation is needed with the Ministry of

Defense, FSS Frontier Service of the Russian Federation, Ministry of Natural Resources and other interested agencies as well as the use of international experience and expertise to provided a needed technical level of disposal of hazard wastes and remediation of contaminated lands.