

Environmental Remediation of the Former Military Site near Pokrovskoye (Onezhsky District of Archangel Region of Russian Federation)

- 1. Project Name:** Environmental Remediation of the Former Military Site near Pokrovskoye (Onezhsky District of Archangel Region of Russian Federation)
- 2. Project Category:** Demonstration project.
- 3. Project Rationale:** There is a pit with an area of 1,000 sq.m (20 m x 50 m), 6 m deep, filled with over 3,000 tons of petroleum products and located at the coast of the Onega (Onezhsky) Bay of the White Sea near the village of Pokrovskoye, 18 m away from river Pilnema. This storage was created around 1973 or 1974 for the needs of the Russian Navy. In 1994 this military unit was discontinued, the site thereof having been left unowned. According to the local self-government authority, the site is to be taken on a file by the agency entitled with state registration of rights to immovable property. At present, the pit is potentially hazardous site for environment, where the lighter petroleum product evaporates cause an adverse influence on the local community and fauna, contaminating surface water and ground water, and being accumulated in seabed sediments. According to the developed remediation project, the pit is filled with slow-curing and moderate-curing liquid bitumen of SG 70/130 and MG 70/130 types. Lab tests of the fill material show that the latter is contaminated most heavily at the lower edge of the pit bank-up, at the depth of 0.4 to 0.6 m, where the concentrations of petroleum products reach a figure up to 53,550 mg/kg. The petroleum product concentrations right along the bank of the Pinelma at the depth of 1.6 to 1.8 m are estimated as very high, within the range of 5,000 mg/kg, which is due to the well-defined slope of the layers, of which the filling consists. This feature changes drastically the hydraulic permeability as it influences the contaminated water that seeps through the petroleum product storage into the water course. Bottom sediment laboratory test results point to an increase of the contamination of the bottom downstream. Tests performed on samples of the Pinelma water have shown that the petroleum product concentration is at its peak (1.6 mg/dm³) 30 m down the stream of the river from the main outflow of the contaminant as it comes from the pit. Precluding a contingency situation in the area will require a suite of measures to do away with the pit and subsequently recultivation of the oil-contaminated territories.
- 4. Proposed Scope:** The purpose of this project is to demonstrate a cost-efficient methodology of an environmental remediation of disused military sites and handover thereof to civil use. This first case can then be used for remediations of chemically contaminated areas in coastal areas at a larger scale and consequently diminishing the impact of Russian sites on the international Arctic waters.

To attain the above goal the following tasks to be fulfilled:

- (1) *Task 1:* Consolidating data on the baseline level of contamination in the project area and its impact on the environment.
- (2) *Task 2:* Preparatory activities: laying temporary roads for the construction vehicles and machinery to move along the perimeter of the site; building

artificial pads, onto which the materials and equipment to be used will be offloaded.

- (3) *Task 3:* Amelioration (earth-moving operation of the scale of 308.5 cub. M.).
- (4) *Task 4:* Removing surface water and ground water from the pit, heating the petroleum products in situ using a steam generator and transporting them into accumulative tanks; steam-heating the tanks with oil sludge, pumping them into bitumen distributors, transporting them away for further petroleum product recycling (all the said activities performed at the condition that the entire amelioration scope has been done); identifying best oil sludge utilization methods.
- (5) *Task 5:* Remediating the bottom, the sides and the bank-up of the oil storage pit and the contaminated and disturbed areas, which are adjacent thereto (3,165 sq.m), using state-of-the-art remediation techniques.
- (6) *Task 6:* Developing methodological recommendations on remediation of abandoned oil storage sites and contaminated territories of former military facilities in the Russian Arctic.
- (7) *Task 7:* Taking samples for contamination tests before and after the remediation in order to evaluate the efficiency of the applied clean-up technologies and come up with recommendations and methods for subsequent cleaning operations in contaminated areas.

Project Milestones:

1. Preparation.
2. Pit elimination.
3. Interim report.
4. Remediation of disturbed and contaminated lands applying state-of-the-art techniques; chemical analysis of the samples.
5. Final report; methodological recommendations on remediation of disused oil storage sites and contaminated territories of phased-out military facilities in the Russian Arctic region.

5. Expected Result: Clean-up of the site of a former military facility, abatement of the environment in the area of Pokrovskoye near Onega Bay, prevention of petroleum seepage into the White Sea, demonstration of a cost-effective methodology of environmental remediation applicable to territories of disused military facilities for further transfer to civil use and later larger-scale operations intended to clean up chemically contaminated sites in coastal areas thus reducing Russia's impact on the international Arctic waters.

6. Current Project Status: the project is ready for its implementation as an environmental and a topographical-geodetic survey have been conducted and the relevant design for the pit elimination has been developed under municipal contract No. 69 of November 11, 2007 with Onega Municipality. The design project includes a review of natural, climatic and area-specific features that contributed to the formation of the confined ground water and ground water discharge patterns in the area surrounding the pit. It also describes the conditions for the many years of a washing out of contaminants from the storage and adjacent sites and their penetration into water. The deliverables

also contain a comparison of the various oil contamination elimination (landfilling) and utilization technologies, different in their physical and chemical gist.

The effort to design the mentioned elimination of the petroleum product storage and the mentioned remediation of the pit-adjacent areas within the overall site and water bodies along the lines of various technological alternatives evaluated on their technical, environmental and financial merits has evidenced as optimal the solution, which includes performance of amelioration activities, an installation of an anti-filtration curtain and a capital fencing around the storage, and a remediation of the affected areas, the overall estimated cost totaling 7,703,790 rubles at 2008 values (YQ1). This amount does not include the lease of the vehicles and machines contemplated in the project, the cost of the energy saving and the cost of the construction activities aimed at the utilization of the oily sludge.

- 7. Project Stakeholders:** Archangel region government bodies responsible for environmental protection, Russian Environmental Inspectorate branch in Archangel region, local community.
- 8. Project Replicability Potential:** This demonstration project focuses on a remediation of the environment in an area formerly occupied by a military facility, which can subsequently be transferred to civil use. The results of this demo project will be applicable not only to disused military sites in the Arctic but also to other military sites in Russia where the final civil purpose of the site may be different but the remediation procedure would be similar. As a result of implementation of the demonstration project, a methodology for restoring a territory for former military unit (discontinued) will be demonstrated so it can be used for military-to-civil transfer of other sites. The tested approaches can attain a broader use in Russia and overseas.
- 9. Project Timeframe:** Summer 2009.
- 10. Project Funding:** 50% (130,000 USD) by UNEP/GEF Project (GEF funds) and 50% by the Administration of Archangel Oblast.