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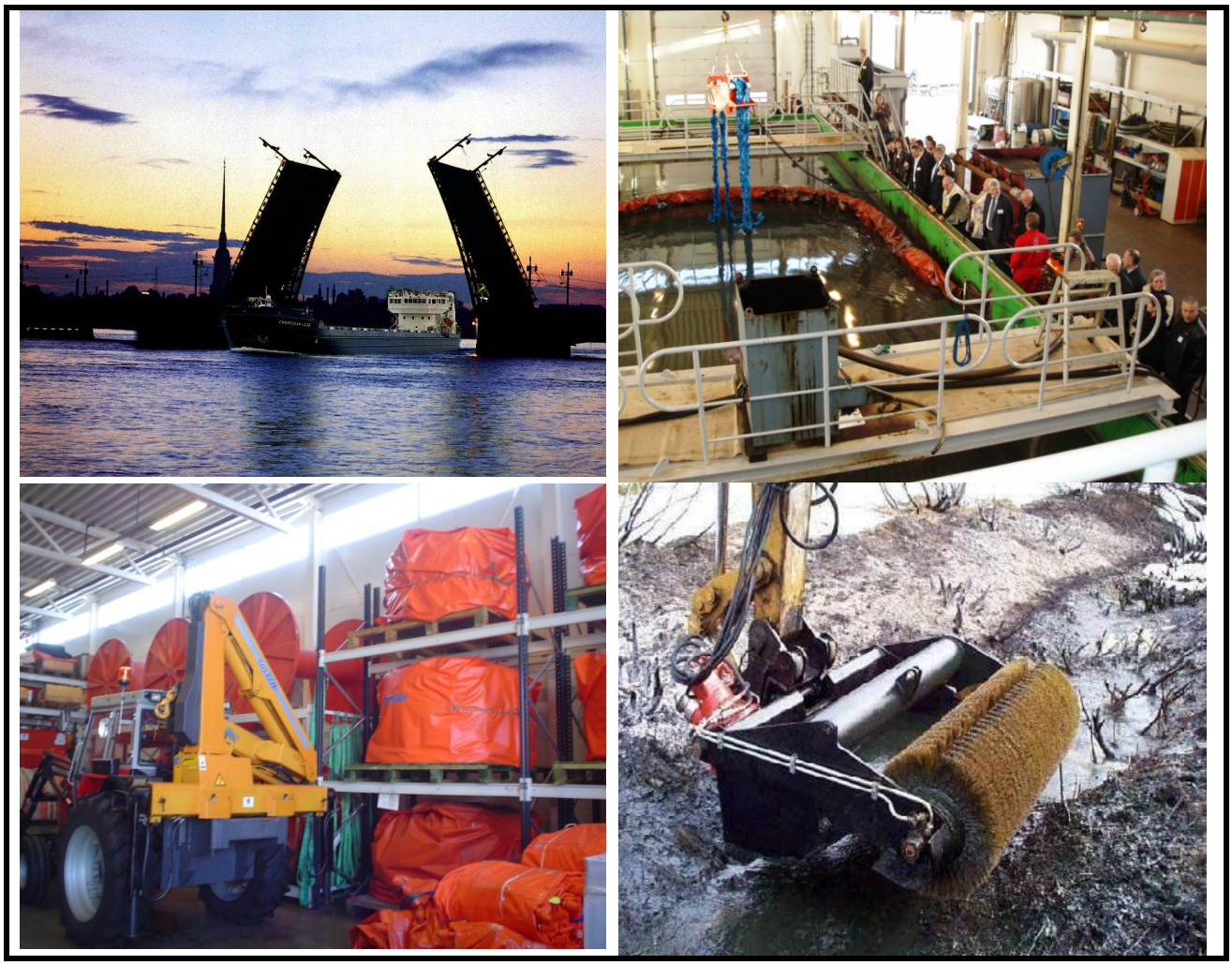
# St. Petersburg Oil Recovery Training Centre "SPORT"

# FEASIBILITY STUDY



**Jorma Rytkonen, Kari Lampela, Alexey Orekhov,**

**Igor Berezin, Ksenia Shelest and Terhi Lindholm**

*Kotka – St. Petersburg 2008*

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South-East Finland - Russia
New Neighbourhood Programme

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# EXECUTIVE SUMMARY

The main goal of this work was to prepare a feasibility study for St. Petersburg Oil Recovery Training Centre to form a basis for the further tender process of architectural and constructional drawings of the centre. The study has been financed by the EU/TACIS funding instrument and prepared by the Russian – Finnish project team.

The first part of this study contains background information of other oil recovery centres or similar facilities in the world. The attention has been directed to the most well-known facilities and bodies offering either training or testing services for oil recovery personnel and other relevant bodies. During the feasibility study phase the members of the project team acquainted themselves with the Norwegian Oil Recovery Centre in Horten, Norway.

Lessons learned from the foreign training centre and depots show that the Norwegian model is well working, but far too complex and expensive. If the Norwegian model is adapted to Russia, it needs changes in Russian legislation. However, there are a lot of advantages in the Norwegian concept such as well-organized, harmonized training for the national level, VTS and pilotage service are located in the same building, thus enhancing the cooperation and coordination between officials, tests can be performed with oil in the test tank and the centre creates a good network with national R&D bodies.

French Cedre was observed mainly to concentrate on research and development and there are already many excellent institutions in Russia for that kind of activity. However, Cedre can provide valuable information also to Russian authorities.

REMPEC in Malta is mainly a coordinating and information centre, which for networking purpose may have a certain cooperative role with the St. Petersburg Oil Recovery Training Centre. One mode of cooperation could be the international exchange of experts, seminars and joint library or database of the lessons learned worldwide.

Generally it can be seen that in order to reach the goals which the training centre is planned to reach, there must be possibilities to practice in near real circumstances. So there is a need for a test basin with a wave generator for testing and practicing the use of skimmers and booms, enough open space for spreading out booms and testing power packs and preferably also the possibility to have a shoreline outside the centre for practicing with response equipment also at sea. All these in addition to classrooms equipped with modern IT and audio devices and functions. It depends then on the Russian legislation, if it needs to be IMO accredited to provide IMO training courses.

The need of training, i.e. the potential of the experts to be trained is based on the statistical analyses which show that there are more than 800 companies which, based on the Russian legislation, need to have trained personnel at their service. Thus, the general turnover of the SPORT centre could be about 500 persons per year (e.g. 300 persons by Makarov Academy courses and 200 - for commercial training) for the first stage.

The oil combating personnel training can be seen taken place on three basic levels: basic (primary) training, upgrading training and hands-on training.

Training of the personnel should be organized in groups. Number of trainees in the group is determined by technical requirements of the pool (test tank), storage room facilities and equipment used and instructors working in the centre. Maximum group size within this study was defined to be 30 persons. However, depending on the course and activity smaller groups i.e. 8-10 persons are relevant. The lectures and simulations take place in the classrooms which may hold larger groups of 20-30 persons maximum.

The required personnel of the centre consists of 8–10 specialists from which 3 persons belong to the administrative personnel, 3 – 4 persons to the training team and finally a team of 3 experts is required to take care of technical questions, run the workshops etc.

For the design work the St. Petersburg City Administration defined a land area in Krasnoselsky district. The area under consideration is located nearby the Vodokanal's water treatment unit having access to the Gulf of Finland. Thus the area is suitable for terminal and dock design, and has proposed highway access. The proposed main building, supporting depots and other facilities will be located in this area.

The main facilities of the training centre are divided into indoor and outdoor facilities. Main indoor facilities are the main interior hall, training classroom for 20 persons, laboratory room(s), test tank hall, subsidiary rooms and technical service rooms. Outdoor facilities include depots and relevant supporting facilities. The technical specifications of these facilities are shown in the appendix of this Feasibility Report.

The most essential part of the training centre among the main office and lecture rooms is the test tank for oil boom and recovery device testing and training. The tank is proposed to have a wave making device and an absorbing beach which can also be used for shoreline studies if covered with gravel or sand, or other material and/or vegetation. More detailed description of the proposed facilities is shown in this report.

One essential part of the centre is the outdoor facilities including the depot with oil recovery and boom equipment. This material is essential for training, but it also has value as a depot in a real oil spill situation. A working area for assembly, service and repairing of the facilities is required at the depot. This facility should also have facilities for equipment cleaning after usage with oil, oil-water separation chambers and relevant ventilation systems with explosion-protected light fittings and power supply systems.

During the writing phase of this report, i.e. in the late autumn of 2008 the tendering process has also been started keeping the project on schedule as has been stated in the original project plan.

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## List of Symbols & Abbreviations

| | |
|---|---|
| BP | British Petroleum |
| CEDRE | Centre for Documentation, Research and Experimentation on Accidental Water Pollution |
| Committee | Committee for Nature use, Environmental Protection and Ecological Safety City of St. Petersburg |
| EARL | East Asia Response Private Limited |
| EMERCOM | Ministry of Russian Federation for Civil Defence, Emergencies and Elimination of Consequences of Natural Disasters |
| EMSA | European Maritime Safety Agency |
| ERG | Emergency Rescue Groups (Russia) |
| ERS | Emergency Rescue Services (Russia) |
| EU | European Union |
| GBP | UK Pound Sterling |
| GC/MS | gazcromatographic/mass spectrometer |
| GIS | Geographical Information System |
| GPS | Global Positioning System |
| HUT | Helsinki University of Technology |
| IFP | Innovation, Energy, Environment research and training centre, France |
| IFREMER | French Research Institute for Exploitation of the Sea |
| IMO | International Maritime Organisation |
| IPIECA | International Petroleum Industry Environmental Conservation Association |
| ITOPF | International Tanker Owners Pollution Federation LtD |
| KYAMK | Kymenlaakso University of Applied Sciences |
| Makarov | Admiral Makarov State Maritime Academy |
| MARPOL | International Convention for Prevention of Pollution from Ships |
| MCA | Maritime and Coast Guard Agency (UK) |
| MMS | dept. of Interior Minerals Management Service |
| NCA | Norwegian Coastal Administration |
| NGO | non-governmental organization |
| OHMSETT | Oil and Hazardous Materials Simulated Environmental Test Tank |
| OPA | Oil Pollution Act (in USA) |
| OPRC | Oil pollution preparedness response and co-operation (IMO's) |
| OSRL | Oil Spill Response Ltd |
| OSWAT | Oil Spill Waste Treatment (project) |
| REC | Regional Environmental Centre (Finland) |
| REMPEC | Regional Marine Pollution Emergency Response Centre for the Mediterrannean Sea |
| RC | Regional Commander |
| RRS | Regional Resque Service |
| SFT | Statens forvieningstillsyn |
| SINTEF | Nongovernmental Norwegian research and development institute based in Trondheim |
| SITRA | the Funds of Finnish Independency |
| SYKE | Finnish Environment Institute |
| UFIP | Union Francaise des Industries Pétroliéres |
| UK | United Kingdom |

# 1. INTRODUCTION

Oil and oil products transportation from Russia is rapidly increasing. St. Petersburg and adjacent regions are located in the focus of these activities. Due to this fact and to be properly prepared, the need of competent and trained oil pollution response and recovery personnel capable to operate response and recovery equipment and materials properly is imminent. At the moment there is neither installation nor centre where such practical training could be implemented. There is a great need to plan a feasible and sustainable training centre capable to train all personnel involved in operational and practical response, cleaning, recovery and waste management duties. Committee for Nature use, Environmental protection and Ecological safety, City of St. Petersburg as well as St. Petersburg's Multifield State Unitary Environmental Enterprise "Ecostroy" consider that only properly planned, constructed and equipped training centre with competent instructors would be able to satisfy the need of the above-mentioned training (Figure 1).

St. Petersburg Oil Recovery Training Centre would, after taken into practice, have an immediate positive impact in preparedness to response to any incident and threat to the environment. Also third sector voluntary persons could be trained to perform clean-up procedures. Training centre with real equipment will also give additional value to the simulator training currently in progress in Admiral Makarov State Maritime Academy. The training centre can also be used to test new recovery equipment and materials as well as to train personnel to use new equipment.

Moreover, St. Petersburg Oil Recovery Training Centre could serve adjacent regions to train their response personnel.

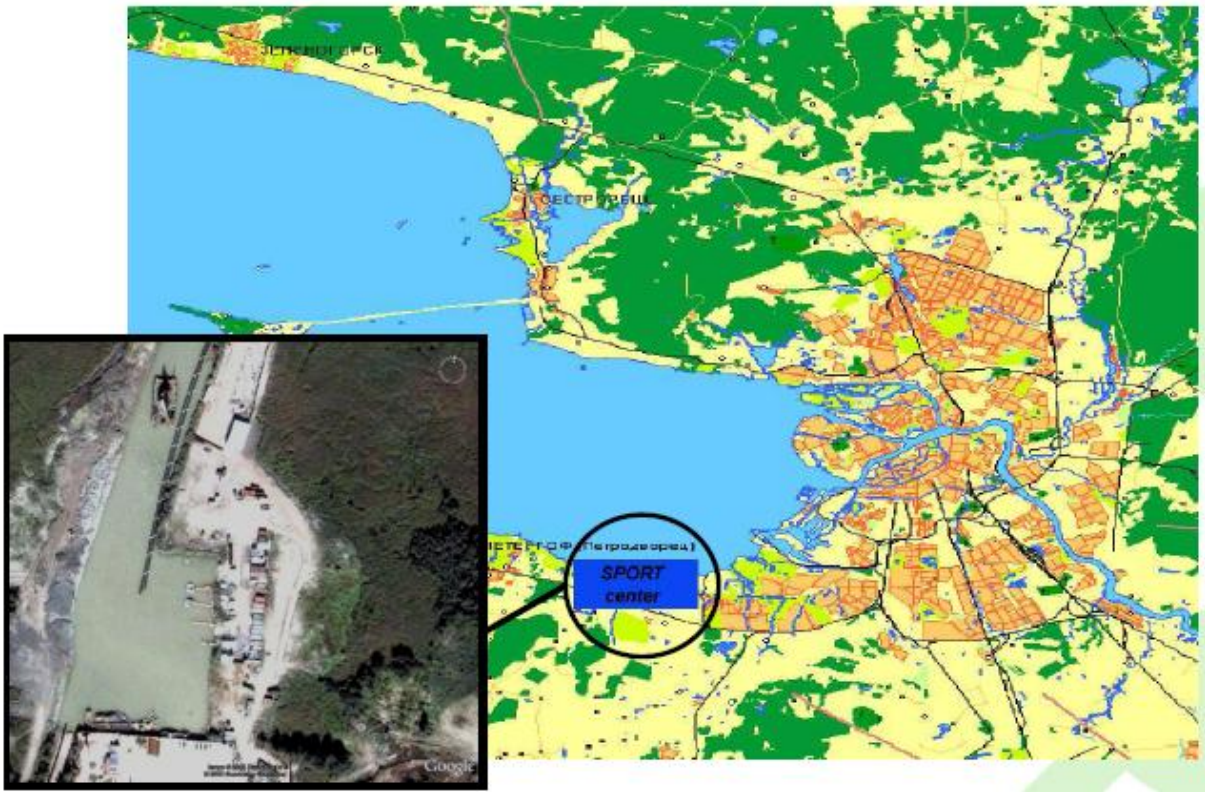



*Figure 1. Proposed location of the training centre in St. Petersburg (Krasnoselsky district).*

## *1.1 SPORT goals, tasks and focus areas*

The main goal of the SPORT project is to produce feasible plans and drawings to make it possible for the St. Petersburg City Administration to build a sustainable oil pollution recovery training centre in St. Petersburg. In order to fulfil this task the following sub-goals can be set:

1. to produce methodology, curriculum and plans to perform training of personnel involved in operational and practical response duties, performing recovery, clean-up and waste management duties and procedures, working in recovery and management of polluted soil, managing disposal of oily or otherwise polluted waste and operating, maintaining, repairing and cleaning equipment, machines and materials used in pollution prevention and recovery; and
2. to produce a list of necessary equipment, machines and materials essential to achieve the objective indicated in item b);
3. to produce a feasibility study for wider use of the training centre in the adjacent regions of St. Petersburg.

Planned main actions of the project are as follows:

1. to form a consortium / project group of Russian and Finnish experts capable and with mission to produce relevant and sufficient information, requirements and details to establish plans and drawings for contracting and construction procedures,
2. to produce relevant and comprehensive training plans and to
3. to produce feasible equipment and material summary and list;
4. to organize and implement a competitive tendering procedure in order to acquire
   - architectural drawings,
   - constructional drawings,
   - heating, water and air conditioning drawings,
   - electrical drawings and
   - other essential drawings including safety
5. to study and produce a document of the training centre's possibilities and feasibility to serve St. Petersburg adjacent regions and their needs and requirements in described training, and
6. to present and submit the results of the project to the St. Petersburg City Administration for eventual constructing bids.

## *1.2 Partners*

The partners of the SPORT project are:
- City of Kotka (lead partner)
- Kotka Maritime Research Association
- Finnish Environment Institute
- Kymenlaakso University of Applied Sciences
- Committee for Nature use, Environmental protection and Ecological safety,
- City of St. Petersburg
- Admiral Makarov State Maritime Academy
- St. Petersburg's Multifield State Unitary Environmental Enterprise "Ecostroy"

For the execution of the project the following steering group was nominated:

Chairman Vsevolod Telitsyn, Vice-Chairman, Committee for Nature use, Environmental Protection and Ecological Safety, City of St. Petersburg
Vice-Chairman Igor Berezin, Project Manager, Committee for Nature use, Environmental Protection and Ecological Safety, City of St. Petersburg
Member Ksenia Shelest, Russian Project Coordinator, Committee for Nature use, Environmental Protection and Ecological Safety, City of St. Petersburg
Member Sergey Aisinov, AMSMA Training centre, Director
Member Hannu Tuittu, Director of Finance, City of Kotka
Member Jorma Rytkönen, Project expert, Kymenlaakso University of Applied Sciences
Member Kari Lampela, Senior Engineer, Finnish Environment Institute
Member Saila Ina, Financial Coordinator, Kotka Maritime Research Centre
Member Terhi Lindholm, Finnish Project Coordinator, Kotka Maritime Research Centre

## *1.3 The goal of the feasibility study*

This report contains the feasibility study of the SPORT project. The main aim has been first to review the lessons learned and equipments in usage of selected oil recovery centres worldwide and then to define necessary equipments, organizational structure and content of the special trainings for the personnel (study plans), technical conditions and needed equipment (recommendations) for the St. Petersburg centre. The schedule of this work has been determined to take place in the spring and summer of 2008, thus the feasibility study could be completed in the late autumn of 2008, to get time to prepare necessary bidding documents for the architecture design of the centre.

The structure of the report can be seen on the content page: First a review on the existing oil recovery training centres worldwide has been made with some recommendations for this work. Then an analysis has been made to define the need and legislative borders for optimal design of the centre with the necessary tools, equipments and staff onboard. Finally a detailed analysis has been made to define the necessary lectures and training modules followed by discussion and conclusions.

The principal authors of this feasibility study are Jorma Rytkönen and Kari Lampela from Finland and Alexey Orekhov from Russia. However, this report would never have been possible to write without the great help, comments and review of the whole project team, identified in Chapter 1.2. The authors would like to thank the whole team and also to express their gratitude to the EU South-East Finland – Russia New Neighbourhood Tacis funding instrument for making this study possible.

# 2. OIL AND TRAINING CENTRES – CASE STUDIES

## *2.1 HORTEN, Headquarter for Emergency Preparedness and Response of Norway*

### 2.1.1 Oil spill response organisation in Norway

In Norway, oil spill response has been arranged much in the same manner as in Finland. The response operations are based on private, municipal and government contingency plans, on the basis of which the Norwegian Coastal Administration (NCA) draws up a national contingency plan. The Norwegian Coastal Administration is a government agency under the Ministry of Fisheries and Coastal Affairs.

Polluter pays is the main principle in Norway, when an accident happens at sea. Harbours are responsible on releases on their own areas. A polluter must request the Norwegian Coastal Administration for assistance before it takes measures. The NCA has usually mobilised the necessary forces immediately, but will not do anything before help is requested, or it may also offer help. The companies engaging in offshore operations have response forces of their own, and the NCA is not involved in these operations.

### 2.1.2 The facilities in Horten

NCA's Department of Emergency Response is located in Horten. SFT (Statens forureningstillsyn) wanted to establish a centre in Horten already in the middle of the 80s. Even before that, there was a contingency depot and other operations related to oil spill response in Horten. Horten is also strategically well located by the Oslo fjord. The implementation of these plans did not, however, start before the traffic control centre of the Oslo fjord started to put pressure on the state, and the project became a cooperation project. At present, the traffic control centre of the NCA occupies one half of the building, and the oil spill response department of the NCA (former SFT) is located in the other half. The present centre was completed in 1997.

In the buildings of the Coastal Administration in Horten exist following facilities:
- headquarters for emergency preparedness and response
- training centre
- test Centre
- workshop
- material depot

In the main building exist also the following organisations:
- Oslofjord Sea Traffic Department
- Vessel traffic centre
- Pilot services

*Figure 2. Test hall in Horten (left) and the wave tank in it (right).*

### 2.1.3 List of the main duties of the Department for Emergency Control in Horten

**General**

The centre is the headquarters of Norwegian Marine Pollution Control having almost all the duties, which are needed in oil spill response, planning and operations around the whole coastline of Norway. The shoreline operations are managed by a different authority. Research and development is not included in the duties of the centre, but the test basin of the centre can be used for research by other institutes, private industry etc. Training is an essential part of the operations. People are annually trained for different oil spill response tasks. The training is designed for the personnel of the state, municipalities and private enterprises. The running of the centre is totally funded by the state budget

**List of the main duties**

- oil spill response coordination in Norway in both governmental and municipal level
- make the rules for oil spill response preparedness for such companies and industry, which may cause environmental risks, like offshore industry
- Department is responsible and is leading the state's oil spill response operations
- act as a national training centre in oil spill response
- act as a national test centre for Norwegian oil spill equipment manufacturers
- act as one of the Coastal Administrations equipment depots
- the centre is responsible to take care of state's oil spill response equipments, which are located in 15 separate places (also in Horten) along the Norwegian coast and Spitsbergen. The value of the equipment is approximately NKR 190 million.
- the department also has the right to use the oil recovery vessels, the value of which is about NKR 85 million
- the department is also responsible for aerial surveillance
- to create a good, preventive system for combating environmental accidents in the Oslo fjord
- to create good preparedness so that the negative consequences of an environmental accident remain small
- to act as a training centre for marine safety training and response training for environmental accidents, both nationally and internationally
- to promote the exports of Norwegian environmental technology related to the combating of environmental accidents and marine safety

- the headquarters of the oil spill response centre of SFT, at present the NCA
- national test centre for oil combating equipment
- a reference frame for Norwegian products and services

*Figure 3. Material depot at Horten. Different skimmers and accessories (left), large booms (right).*

### 2.1.4 Headquarters and its tasks

The oil spill response department of the NCA co-ordinates and controls the combating preparedness of the state, municipalities and private companies in the whole country. It also sets the contingency requirements for establishments that may cause an environmental hazard, e.g. offshore operations and Norwegian industry. The department is also responsible for and heads the state's response operations in unexpected spills.

### 2.1.5 National training centre

Training is also a central part of the activities. The department has training courses for all the different fields of the oil spill response. Personnel from the state, municipalities and private enterprises can take part in the courses. Training can be intended for the own personnel of the Coastal Administration, but the centre has conducted courses for e.g. Norsk Hydro and Statoil, national energy companies. Department has conducted training also abroad (Indonesia, Japan, etc.)

### 2.1.6 National test centre for oil combating technology

Testing of new response equipments is an important part of the research and development work of the department. Especially mechanical recovery equipments can be tested in the Horten test basin. The main characteristics of the indoor test basin are:
- length 30 m
- breadth 7 m
- depth 4 m
- volume 800 $m^3$

The basin has also a wave making machine and artificial shoreline at the other end of the basin. The test facilities are best suited for testing oil booms and skimmers. The test

facilities can be used also by other institutes than the Coastal Administration and also by private companies using either their own personnel or the permanent workers of the centre.

*Figure 4. Part of the equipment has been installed into movable containers in Horten.*

### 2.1.7 Reference for Norwegian products and services

The NCA uses a lot of marine safety and oil combating equipment as well as related services. All purchases are based on the assessment of quality, design and price, and they are not restricted to Norwegian products only. The equipment that the centre uses can also act as an example and reference for Norwegian exports.

### 2.1.8 Finances

The building of the centre was financed by Miljöverndepartementet (Environmental Department of the Ministry of Fisheries) and the running of the centre is also totally financed by the state. The centre has limited possibilities to get own income by renting the test facilities and offering its expertise, but this does not pay a significant role in the economy of the centre. More own income is not planned because the main purpose of the centre is to be the national oil spill response authority. As the government has cut down its financing during the past few years, part of the operations, e.g. international courses, have been reduced.

## *2.2 Cedre, Training & Research Centre of France*

### 2.2.1 Background

The name Cedre is short for *Centre de Documentation de Recherche et D' Experimentations sur les Pollutions Accidentelles des Eaux*, i.e. the centre of documentation, research and experimentation on accidental water pollution.

Cedre was created in 1978 within measures taken after the wreckage of the oil tanker "Amoco Cadiz", to improve preparedness against accidental marine pollution and strengthen the national response organisation. Cedre is part of the French Polmar plan, and the tasks of Cedre are updated as the Polmar plan is being updated.

Polmar Mer and Ter are the contingency plans of the state of France for accident-based spills at sea and on land.

- Cedre is mostly a research institute, which has large indoor and outdoor testing/laboratory facilities.
- it can take part in operations as an adviser
- Cedre has no equipment depot.
- information service is a vital part of Cedre´s activities

Cedre manages an annual budget of around 4.5 million Euros. Slightly more than half of it comes from subsidies and contracts with members of the association or public and professional bodies. The rest comes from institutional (private companies, municipalities, European Union, States) and industrial contracts.

*Figure 5. Cedre's man-made beach and its water body (6 000m$^2$) for large-scale testing and training purposes.*

### 2.2.2 Cedre's organisation

Cedre is a non-profit association that reports to the Ministry of the Ecology and Sustainable Development, and has a Board of Directors from: 1) the state, which is represented by Secretariat Général of the Sea and ministries representing ecology, defence, traffic and infrastructure, internal affairs (l'Intérieur), industry, research and fishery 2) public and trade associations: l'Institut Francais de recherche pour l'Exploitation de la Mer (IFREMER), les Agences de l'Eau (agencies related to inland waters and the sea), l'Institut Francais du Pértole (IFP), l'Union Francaise des Industries Pétrolières (UFIP), le group Rhone Poulenc, le Comité National des Pêches Maritimes et des Elevages Marins, Météo France;

Elected representatives are elected for a period of two years and they represent inhabitants of coastal regions and other members of Cedre.

The Supervisory Board is extensive, which is regarded as a positive thing. Even though representatives of inhabitants belong to the third group, citizen organisations are not represented. NGOs are not represented, and even though this has been discussed, they have at present been left outside Cedre.

Cedre has also a strategic committee, which is responsible for orientation (steering), follow-up and assessing Cedre's technical functions. The strategic committee has representatives from:

- the state of France
- organisations operating in the environmental sector
- the industry presenting great hazards: oil, chemicals and shipping

The main departments of Cedre are:

TRAINING DEPARTMENT, for response personnel for accidental pollution on the shoreline and in ports and harbours, training courses in French and English in management and response to oil and chemicals spills at sea, in ports and harbours, on the shoreline and in inland waters.

INFORMATION DEPARTMENT

CONTINGENCY PLANNING DEPARTMENT, with the knowledge of risk analysis, crisis management and response techniques. Tailor-made contingency plans to the needs of Government or local authorities for their shorelines, industrial plants, ports and harbours, oil terminals or offshore platforms.

EMERGENCY RESPONSE DEPARTMENT, an around the clock advisory service, which provides those in charge of spill response with information on the pollutants, their behaviour, the related risks, the best response methods and techniques, the products and equipment to use and operational data management.

RESEARCH & DEVELOPMENT DEPARTMENT, experiments on various aspects of pollutants, response products and techniques with a variety of tanks, flow flumes and laboratory equipments.

SPILL FOLLOW-UP DEPARTMENT, technological development, monitoring and experience

### 2.2.3 Mission of Cedre

Cedre's mission is to improve preparedness against accidental water pollution and strengthen the national response organisation. The centre's expertise encompasses both marine and inland waters.

### 2.2.4 Tasks of Cedre

Cedre's task is to give advice and assist the responsible authorities in response operations related to hazardous spills. Cedre's role in water protection has been defined in Polmar's circular on 17 December 1997, and its role in combating hazardous spills inland has been defined in an internal circular of Ministries, dated 18 February 1985. According to these, the tasks of Cedre also comprise a 24-hour advisory service, offering advice and information.

The continuous tasks of Cedre are to:
- draw up and update contingency plans (plans in accordance with Polmar Mer and Ter)
- distribute information on the general guidelines and methods of oil spill response
- develop and evaluate combating manners, methods and technology
- approve substances that are used for combating environmental toxins
- draw up handbooks for emergency situations (e.g. how to help a tank vessel in an emergency situation, accidents involving chemicals)
- train persons in charge, team leaders and combating forces (state, cities, local authorities, industry)
- arrange exercises

In emergency situations, Cedre assists authorities in the following matters:
- assesses the risks related to the environmental damage;
- chooses the best possible technology and combating methods and organises the operation;
- assesses the impacts of the environmental toxin and the response operations.

Assistance is offered at Cedre, the headquarters established for the accident or at the accident site. Cedre has more than one hundred interventions annually, both in France and in other countries. Experts from Cedre are called to different locations about 10 to 15 times a year.

### 2.2.5 Cedre participates in the Community Task Force

Since 1987, Cedre has been a member of a group that assists the EU and other states in combating unexpected environmental damages. Cedre has participated in almost all accidents that have taken place in Europe and assisted in many operations outside Europe as well through the EU. Cedre also acts as expert in the environmental directorate of the Commission in questions pertaining to oil and chemical spill response.

### 2.2.6 Cedre's location

Cedre operates in Brest, western France, where the number of employees is about 50. The staff includes engineers, scientists, persons with technical training, etc. The centre has been built in Brest, between the port and Océanopolis (large aquarium) on government land. It has been expanded a few times, and new expansions are being planned. Cedre owns the buildings, but the government still owns the land.

The centre comprises laboratories, in which different oils and chemicals can be analysed and identified, and different experiments with oils and chemicals can be carried out, e.g. the controlled environment flume test, which follows the properties of different substances in various weather conditions and the impacts of combating methods in different environmental and weather conditions. The research and tests related to the approval of different combating substances are also carried out here. There is also a deep-water basin (4000m3) and an artificial beach (6000m2), which can be used for tests, research and training.

Facilities:
- several laboratories
- outdoor and indoor test basins
- material depot
- training facility

Other offices:
- Cedre in the Mediterranean
- Cedre delegation in the Caribbean

Cedre's test basin is 59 m long and 35 m wide, with one truncated corner. The basin can be filled to a varying extent and its water depth generally varies between 2 and 3 m. Three of its sides are sloping and the fourth, its breadth, is vertical. It is equipped with floating pontoons of adjustable shapes.

The basin is regularly used for practical exercises as part of certain training courses, during which oil is released within an area surrounded by floating booms, so that different types of skimmers can be deployed. It is also used several times a year to test recovery means on the water surface, as part of Cedre's response equipment and technique assessment programme. The basin can also regularly be used for other specialised purposes, such as displays and demonstrations of equipment for manufacturers (Figure 6).

*Figure 6. Exercise using a skimmer on Cedre's technical facilities (Cedre).*

### 2.2.7 Forms of operation

***Gathering of material and distribution of information***

Cedre gathers all material related to oils and chemicals as well as the hazards that they pose, and the ways of combating them that may be relevant to its work. It exploits research carried out by other research centres and establishes contacts between scientific thinking and practical measures. The operations of Cedre are interdisciplinary, and it emphasises an environmental, financial and social point of view, i.e. all these aspects must be taken into consideration in order to achieve the best possible result.

Cedre wishes to be an objective source of information and operates openly so that the sources of its financing are generally know and the information it produces and gathers is available to everyone.

Cedre's aim is to be able to rapidly give answers to questions related to urgent response tasks based on its material. Therefore, the information has been gathered and formulated in the following manner:

- the Polmar contingency plans, other contingency plans for inland waters, handbooks dealing with crude oil and chemicals, list of combating equipment
- databanks on the consequences, combating methods and sensitive areas
- information on CD-ROM, containing information on the properties of 300 000 chemicals and 400 crude and refined oils
- data searches through the Internet
- predictive models and systems supporting decision-making

The material gathered by Cedre and its own research results are published and can be ordered. The latest publication deal with draining vegetable oil into the sea, and another recent publication is called Containers and packages lost at sea. Both are so-called operational guidelines. Cedre has web pages under the address www.le-cedre.fr, and they have partly been translated into English. At the moment, all the material on the web site is being translated into English in order to give the information a wider audience.

Cedre's aim is to produce material and information that is available for everyone and it uses the Internet for this purpose. The web pages of Cedre contain information on al-

most all major accidents or events related to oil, chemicals or other transports involving an environmental hazard. The list starts from Torrey Canyon in 1967, and it also includes, e.g. MSC CARLA, which transported a radioactive substance. The pages contain links to other pages, like those of the government in question, which contain information on the event, newspaper articles and the web pages of Greenpeace in the MSC CARLA case, for instance.

Cedre also publishes theme bulletins twice a year and a monthly newsletter dealing with current matters.

***Research and development***

Cedre carries out applied research mainly dealing with the following matters:
- the behaviour of oil and chemicals in different conditions
- the best combating methods in various conditions
- the use of different chemicals in response actions and to some extent their environmental impacts

Within basic research, Cedre co-operates with other research centres, such as Ifremer, and exploits their results.

The technical equipment makes it possible to assess and develop new combating equipment, which can be used both at sea and along the coastline, for different types of oil in the right conditions. The test laboratory, the flume test and the laboratory make it possible to conduct tests with different pollutants and combating equipment of different kinds. In this area, Cedre also co-operates with its partners at sea.

***Testing***

In France, the approval of Cedre is not necessary for combating equipment, but in practice the buyer wants to have equipment that has been tested and approved by Cedre.

The chemicals, e.g. dispersants, used in response actions must be tested and approved by Cedre.

***Training***

Cedre trains both national and international forces. Cedre has planned the training so that the persons participating can work in conditions that are as close to a real situation as possible. The deep-water basin and the artificial beach are used for creating combating situations that resemble real accidents. Cedre also arranges training in other places than Brest.

***24-hour emergency service***

The advisory services of Cedre, which offer assistance and guidance in different emergencies, are a fundamental part of its operations. Cedre gives advice on the phone or by fax to persons who are in charge of combating, on pollutants, their behaviour, the environmental risks, best combating methods, etc.

This form of operation has been defined in the French Polmar decree 2.8.

***Cedre's finances***

The annual budget of Cedre totals about 4 million euros. About half of this consists of government subsidies or is based on agreements with different administrative bodies. The other half comes from agreements with companies, cities, local and national authorities, the EU, and other states.

It is an interesting feature that Cedre itself presents different research and development projects to the strategic committee, whose members can choose the projects that they are interested in and wish to finance. The results and reports are, however, always available for everyone. This method of operating guarantees the objectivity of Cedre, which is of major importance for its credibility. In practice, Cedre presents a long list of projects, and only those for which a financier can be found are carried out.

About 80% of the budget is related to oil spill response, and only 20% to chemicals.

## *2.3 OSRL of United Kingdom*

### 2.3.1 Background

Oil Spill Response Ltd is the largest oil spill response organisation in the world. East Asia Response Ltd is the largest corresponding organisation in the Asian Pacific. Together these form the so-called Global Alliance, which can react to oil accidents worldwide (tier 3), at any place and any time.

The foundation of OSRL lies in an oil spill response organisation owned by BP, which has been developed into the present OSRL. Today, Oil Spill Response Limited, established in 1985 as an industry resource, is a company entirely owned by 32 oil companies, which can through membership buy oil spill response services.

Response centre in Southampton, England and the Alliance partner in Singapore, which are on standby 24 hours a day providing a global response to oil spills whenever and wherever they occur. Hercules aircraft owned by OSRL allows the mobilisation of personnel and equipment without delay.

OSRL is a purely commercial company owned by members, which are the main international oil companies. OSRL has also associate members for those, who do not need the full service OSRL can offer. The yearly costs are paid by members.

OSRL offers its services in case of accidents, but can also help members in training, contingency planning and environmental impact assessment.

Also other countries and companies, which are not members of OSRL, can order assistance from OSRL. OSRL will then charge for its services. It has also a corresponding organisation in the Asian Pacific and together they form a consortium called Global Alliance.

### 2.3.2 Mission

OSRL´s mission is "To provide resources to respond to oil spills efficiently and effectively on a global basis."

### 2.3.3 The tasks of OSRL

The primary task of OSRL is to be available for its members when an oil accident occurs or there is a threat of an accident anywhere in the world, 24 hours a day, and 365 days a year. The other tasks of OSRL are training and consultancy.

List of different tasks is as follows:
- response (OSRL has been involved in a wide range of response activities in incidents ranging from rail tanker derailments to major offshore oil spills)
- training
- offers standard courses from Antarctic oil pollution control to inland spills.
- consultancy
- develops contingency plans
- undertakes audits
- environmental impact assessments
- UK Response Services include emergency response, contingency planning and exercises. UK Response operates through a network of regional bases operated by subcontractors under the management and supervision of OSRL.

### 2.3.4 Membership in OSRL

Global Alliance serves mostly its members, i.e. international oil companies. Each member has a representative in OSRL's Board of Directors. The Management Team elects a number of Directors, who form the Alliance Management Committee, which looks after the interests of the members.

Members can be either so-called participants or associates. Membership as participant is available in three bands, and different service level agreements are connected with each of these. The price of the membership is based on the band and service. Membership entitles to:
- shareholding in line with membership band
- guaranteed worldwide response services as defined by the Service Level Agreement

When a company becomes an associate, it pays in accordance with the services that it wishes to obtain, i.e.
- guaranteed response services at the specific site(s) as defined by the Service Level Agreement.

Associate membership is intended for companies that need OSRL's services, but not to the extent that full membership would be required. Associate membership is available in four bands, depending on the amount of oil that is handled and the number of sites at which OSRL's services are required.

The present members of OSRL are: ADNOC, Amerada Hess, Apache Corporation, British Gas Group, BHP Billiton, BP, Chevron Texaco, CNR International, ConocoPhillips, EnCana, Eni, ExxonMobil, Kerr-McGee, Kuwait Petroleum Corporation, Marathon, Nexen, ONGC, PDVSA, Perenco, Petro-Canada, Saudi Aramco, Shell, Statoil, Talisman, Total, Unocal.

The associate members are: Anadarko Petroleum Corporation, Associated British Ports Holdings Plc, ATP Oil&Gas (UK) Limited, Bristol Port Company, Burlington Resources (Irish Sea) Limited, Centrica Storage Limited, Devon Energy Ghana Limited, Daragon Oil Turkmenistan Limited, EcoShelf, GDF Britain Limited, Government of Gibraltar, Harwich Haven Authority, HM Naval Base Portsmouth, Hunt Oil Company, Irish Coast Guard, Lundin Britain Limited, Lundin Netherlands B.V. Medway Ports, Occidental Petroleum of Qatar, OPET, Peakwell Management, Port of London Authority, Premier Oil, RAMCO, Sociedad de Salvamento y Securadad Maritima, Sonalgol Presquisa e Producao (S.A.R.L.) Tullow Exploration Limited, Turkiye Petrol Refinerileri A.S., Venture Production Company, Wintershall A.G. Woodside Maurania Pty. Limited.

### 2.3.5 OSRL's operations

***Oil spill response***

The main task of OSRL is to be available for its members 24 hours a day for oil spill response assignments. This has been arranged by using four task forces, one of which is always in emergency preparedness one hour from the office and depot in Southampton at the most. Another team is at a three-hour emergency distance. The head of the task force that is in emergency preparedness answers an emergency call within ten minutes.

OSRL also has oil spill response equipment, ready to be transported for two major oil accidents. The equipment is very versatile, from dispersants to skimmers, booms and pumps. All the equipment is in ready packages that have been cleared by the customs office, so that it may immediately be transported to the Hercules aircraft, which is on standby 24 hours a day, or to some other aircraft in an emergency situation. About 40 people are involved in the response operations and, at the same time, in the management of the depot. They constantly take care of the depot and equipment, and the equipment is also tested in different conditions and with different types of oils in the depot area.

In order not to have to come to assistance in all cases, the teams also train the members and make plans for them. These plans are continuously updated and exercises are regularly arranged based on them.

One important aspect of OSRL's operations is that it acts when a member has asked for assistance. In other cases, it must be clear who provides the financing, and an agreement on the payment must be signed before OSRL will send help.

***Training***

The Alliance organisation is the main trainer of oil companies. During the past 10 years, it has trained 9 000 representatives from 48 countries. The courses are either published courses, in which anyone can participate, tailored courses, or courses according to the IMO model.

About 30 published courses are arranged annually in Southampton, Singapore or at some other location. These courses cover everything from elementary oil spill combating to oil response in cold climates and courses on health and safety.

IMO's 3 model courses are arranged under the supervision of OSRL and EARL in all parts of the world. IMO is renewing its courses, and Alliance has participated by promoting the work.

Tailored courses are mainly arranged when a customer wishes to practise or carry out its own contingency plan. These courses are often arranged at customer premises, but they can be arranged in Southampton or Singapore as well.

***Consultancy***

Consultancy is a growing part of OSRL's operations. The main areas covered are:
- oil spill contingency planning
- electronic interactive plans and modelling tools
- capability assessments/audits
- dedicated in-company secondments
- drills and exercises
- environmental services

The major area consists of drawing up contingency plans. Continuous exercises have an important role in these plans. Through exercises, the plans can be kept up-to-date and given a practical aspect.

The consultancy service feels that it is of major importance that the members and oil companies see the oil cycle as a whole, i.e. prospecting/production, storage, transports, treatment, refinement and distribution.

### 2.3.6 Finances

OSRL's annual turnover, excluding accidents, is about GBP 7 million. GBP 1 million goes to the two Hercules aeroplanes, which are on 24-hour standby, 365 days a year. About GBP 4 to 5 million goes to the depot, its maintenance and the oil spill response personnel.

Members pay the yearly costs. OSRL assists also others than members but only when ordered and paid. Consulting and organizing training is also an important source of income.

### 2.3.7 OSRL and the future

The main task of OSRL is to be available to its members, when an oil accident has occurred or there is a threat of an accident. In order to minimise the number of accidents, OSRL will invest even more in different consultancy tasks.

Another area of emphasis is training. Training arranged at customer premises is a growing trend. It is expensive to transport the personnel of a company to a certain location for training. It is much easier and less expensive to bring the trainers to the persons to be trained. This also makes it easier to take into account the special features of each region, and the participants get more out of the training.

Projects are also part of OSRL's operations, and they are being developed. Among the projects can be mentioned, e.g. ship-to-ship transfers, tier 2 response in the UK, drilling and the protection of ports.

Almost all the members of OSRL also produce and transport chemicals. It is the wish of the members that OSRL would concentrate more on chemicals in future. OSRL tries to adopt and develop its oil spill response equipment so that it will be better suited for chemical spills as well.

## *2.4 REMPEC of Malta*

### 2.4.1 Mission

Assist the Mediterranean coastal states in the implementation of the Protocol concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency.

This centre is only for enhancing the cooperation between oil response organizations of 21 different Mediterranean states. It also assists member states in implementation of the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention).

REMPEC's main duties are training and information service. It has no operational duties, no equipment and no duty service. REMPEC is funded by Mediterranean Trust Fund, where all coastal states are members.

### 2.4.2 Background

The predecessor of REMPEC, the Regional Oil Combating Centre for the Mediterranean Sea (ROCC) was established in Malta on 11 December 1976, in order to assist the Mediterranean coastal states in the implementation of the Protocol concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency (Emergency Protocol) to the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention). It was the first such Regional Centre in the world, set up within the framework of the Regional Seas Programme of UNEP.

The mandate of the centre was extended in 1987 to include "hazardous substances other than oil", and in 1989 the Contracting Parties approved the new objectives and functions of the centre and changed its name to the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC)

Objectives and functions of REMPEC were further modified in November 2001 in order to reflect the new role of the centre envisaged by the adoption of the new protocol concerning cooperation in preventing pollution from ships and, in cases of emergency, combating pollution of the Mediterranean Sea (Prevention and Emergency Protocol).
Operating on the basis of the decisions of the contracting parties to the Barcelona Convention, the centre has been administered by the International Maritime Organisation (IMO), and is financed by the Mediterranean Trust Fund.

The programme of the activities to be carried out by the centre and the relevant budget are discussed every two years by the meetings of REMPEC focal points and subsequently submitted for approval and adoption to the meetings of the contracting parties.

REMPEC "Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea," is based in Malta and hosted by the government of Malta. It’s staff enjoys the status of the United Nations civil servants.

### 2.4.3 Main tasks

The main task of REMPEC is to assist contracting partners to the Barcelona Convention, which includes
- training
- meetings
- information service like:
- databank
- directories and inventories.

The centre maintains an extensive library and a number of databases, and produces various documents.

The training activities of REMPEC consist mainly of tailored regional courses in different member states. The issues dealt with have been e.g. preparedness and response to marine pollution for government administrators and senior managers, illicit discharges from ships and prosecution of offenders, ballast water management issues, bunkers convention and MARPOL convention.

## *2.5 US R&D facilities*

### 2.5.1 Background, OPA90

In the United States of America the oil companies are due to the Oil Pollution Act (OPA90) responsible to take care of oil spill response operations. OPA90 was implemented after the Exxon Valdez accident in 1989. Environment Protection Agency on the other hand and the US Coast Guard on the other make the rules and supervise the state of the preparedness and operations. The oil companies and harbours are responsible for response preparedness and actions and have established several companies

to take care of the responsibilities. Those companies have material, vessels, etc. to fulfil their duties.

### 2.5.2 OHMSETT

The US facility named OHMSETT, The National Oil Spill Response Test Tank Facility, is the only facility where full-scale oil spill response equipment testing, research, and training can be conducted in a marine environment with oil under controlled environmental conditions (waves, temperature, oil types). The facility provides an environmentally safe place to conduct objective testing and to develop devices and techniques for the control of oil and hazardous material spills.

The primary component of the facility is a 203 m long test tank with a width of 20 m (Figure 7). Water depth of the tank is 2.4 m. The tank is equipped with a towing carriage which has a maximum speed of 3.3 m/s. An oil distribution system is also attached to the towing carriage allowing oil or other fluids to be distributed on the water surface or submerged. Tank also contains a wave maker system and a wave absorbing beach. Maximum regular waves are 0.6 m in height and 40 m in length.

*Figure 7. Regular waves generated by the wave maker system of the OHMSETT test facility (OHMSETT 1999).*

Ohmsett’s mission is to increase oil spill response capability through independent and objective performance testing of equipment, providing realistic training to response personnel, and improving technologies through research and development.

Ohmsett's objective is to help response companies with pre-purchase testing of equipment, and to assist manufacturers in product testing and improvements. The facility has proven to be suitable for testing and analyzing the practical effectiveness of equipment such as containment, booms, skimmers, sorbents, temporary storage devices, pumping systems, and remote sensing devices. New to the facility is the ability to conduct in situ propane burns, dispersant evaluations, oil emulsions, and cold water testing.

The typical set of lectures offered (classroom/field topics) in the training programme are:

- physical and chemical properties of oil
- site safety planning
- oil skimmer selection and use

- containment boom selection and use
- booming and recovery strategies
- documentation and record keeping
- damage assessment and claims
- interaction with the news media
- factors affecting oil spill movement
- alternative response techniques
- incident command system (NIMS)
- contingency planning
- global positioning systems (GPS)
- geographic information systems (GIS)
- shoreline characterization

Typically the courses include phases of hands-on field exercises on the test tank. Students will participate in booming and recovery of oil released into the tank. Students will witness the effectiveness of this equipment in varying water conditions involving currents and wave action.

Training will also incorporate field trips in nature, where the collection and integration of GPS, digital images, and other data into GIS format will be used for spill planning and response exercises. The facility, located an hour south of New York City, in Leonardo, New Jersey, is maintained and operated by the Department of Interior Minerals Management Service (MMS) through a contract.

OHMSETT conducts several types of training courses every year, as is shown before. Furthermore there are also tailor-made courses and lectures available depending on the need and focus. Appendix 2 shows a typical weeklong course in oil spill management.

Features and capabilities of the OHMSETT test facility
- a main towing bridge capable of towing test equipment at speeds up to 6.5 knots
- an auxiliary bridge oil recovery system to quantify skimmer recovery rates
- a wave generator capable of simulating regular waves up to one metre in height, as well as a simulated harbour chop
- a movable, wave-damping artificial beach
- an oil distribution and recovery system that can handle heavy, viscous oils and emulsions
- a control tower with a fully-computerized 32-channel data collection system as well as above-and below-water video
- a centrifuge system to recover and recycle test oil
- blending tanks with a water and oil distribution system to produce custom oil/water emulsions for testing
- a filtration and oil/water separator system
- an electrolytic chlorinator to control biological activity
- permanent and mobile storage tanks that can hold over 227,000 liters of test fluids
- a vacuum bridge to clean the bottom of the tank
- staging and shop area for special fabrication

*Figure 8. OHMSETT's test facility (OHMSETT 1999).*

The standard measurable test parameters are the sea state, towing speed, meteorological data, water temperature and salinity, oil recovery statistics and oil quality data. Typical equipments tested are booms, skimmers, sorbents, storage devices during the recovery mode, pumping systems, dispersants etc.

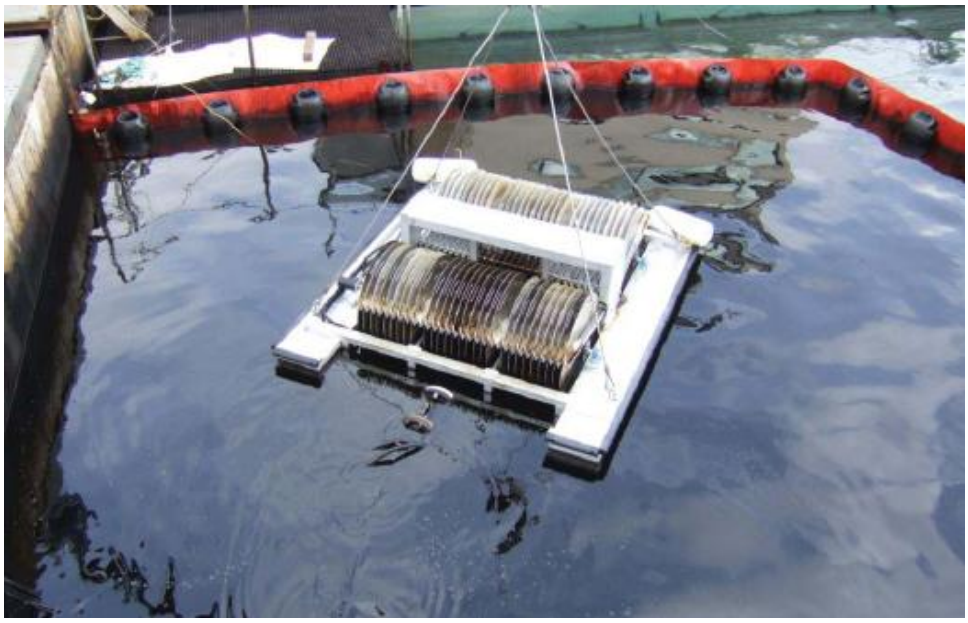


*Figure 9. Typical performance & capacity test lay-out by OHMSETT for a skimmer (the Ohmsett Gazette, Spring/Summer 2008).*

## *2.6 Sweden*

A feasibility study of an oil spill centre was conducted in 2004 by several Swedish authorities. According to the study, following sectors can benefit from a new centre:
- training (oil spill response, fire fighting in ships and gas renovation works
- exercises
- development and testing (materials, methods and tactics)

Sweden has made a feasibility study about the need and possibilities of an oil spill centre. The result of the study was a proposal for national centre for marine environmental protection. It was also found, that the best place to establish a National Maritime Environmental Protection Centre would be Karlskrona in connection with the Navy training centre and Swedish Coast Guard Headquarters. The project was however cancelled mainly due to the following reasons:
- a specified new institution will be too expensive
- there is not enough actual need for training
- it is cheaper to conduct testing in Horten, Norway

## *2.7. Finland*

### 2.7.1 National centre

In the programme of the Government of Finland, 2004, was provided, that the need of an oil spill centre should be examined. The Ministry of the Environment established in the beginning of 2004 an expert group to investigate the need and to make a proposal, if necessary. The report was given to the Finnish Minister of the Environment in February 2005. The main findings of the report are:
- there is a need for a centre
- the main duties of the centre should be:
    - maintenance of response equipment, especially those, which need extended maintenance.
    - to conduct training in real-like circumstances
    - assist in operations
    - act as an equipment depot
    - take part in research and development if a test basin can be financed outside the centre's normal establishing costs.
- the centre should be situated at seaside on the shore of the Gulf of Finland. The exact site was not determined, but Porvoo and Helsinki were mentioned as potential sites.

In December 2005, the Finnish Ministry of the Environment made an agreement with a Finnish consultant to make a plan for the centre's economy and functions. The Fund of Finnish Independency SITRA has shown interest in providing funding for the establishment of the centre. The business plan was prepared.

The main duties of the centre should be to act as a material depot, arrange training and exercises, and assist in operations. The establishment of the centre in the City of Porvoo was again in the Government Programme in 2007. The Government of Finland has

in its proposals for the state budget for 2009 proposed allowance to start the establishing of the centre in 2009.

The centre will be mainly an oil spill response material depot and at first there will be only three workers. The duties of the centre in response operations are insignificant due mainly to the small personnel. Depending on how the project on establishing a national Finnish oil spill centre develops, the centre can also perhaps assist in offering training courses to Russian authorities.

The planning of the centre has started in the autumn of 2008

It must also be taken into account that there is not an urgent need for a national operational centre. There are some commercial oil spill response companies in the Baltic Sea, especially in the Gulf of Finland, which can offer services in case of accidents like OSRL in UK. In case of serious accidents, the Baltic Sea States can ask for help also from OSRL, but it charges for its services.

The new contract between EMSA (European Maritime Safety Agency) and Lamor Corporation Ltd. has increased the open sea response capacity notably. Due to that agreement there are always five coastal tankers available at the Baltic Sea for oil spill response operations and two of them can have oil collecting capacity based on sweeping arm technology. The two collecting equipment units are stored in Copenhagen Denmark and in Porvoo Finland, the latter not far from the St. Petersburg area.

## *2.8 Other centres*

A Finnish company, Lamor Corporation AB, has plans of oil spill centres, and preparations and negotiations for several centres in different countries are in progress. Lamor Corporation AB has a large, 3 000 m2 depot for oil spill response equipment in Porvoo. Lamor offers this material for use in case of oil spill accidents and it can be used also by the Russian authorities according to the terms of the company.

Lamor has also been accredited as a training provider in accordance with the Maritime and Coastguard Agency (MCA). Lamor is also accredited to provide IMO level 1, 2, & 3 training courses at customer premises, on site or at the company's training facilities. Clean Globe International and Lamor Swire, which both are part of the Lamor group of companies, offer also training of personnel and consulting.

## *2.9 Main findings of the different centres*

It depends on the national and even local oil spill response organizations, what kind of selection of tasks the centre gets to fill the gaps, which the very organization cannot handle. In that respect there is no unique solution for a "centre" – it should be more or less tailored to the circumstances. It is also of some importance, that the centre is a responsible, official part of the national oil spill response system. If not, it could leave outside actions because of the stress of such accident situations.

The above mentioned oil spill centres have been designed to meet the special needs of the respective country or area. They are all well functioning organizations for the purposes they are planned.

It can be seen, that the organization, mission, personnel, duties, etc. vary in different centres. Some are purely official, governmental organizations, some commercial; some have tens of employees, some only few.

In Norway, the centre is a vital part of the Norwegian pollution control and is not in fact a separate centre to coordinate the efforts of different authorities. To a certain degree the same applies to the planned centres in Sweden and Finland. The OSRL is a purely commercial enterprise that has no connections to governmental agencies in UK or in any other countries. The rest are somewhere between, when the organization is concerned.

The Norwegian centre offers almost all the services needed in response operations, naturally with the help of other administrations, private contractors, etc. The other extreme in REMPEC, which provides mainly just information and support to national authorities with no duty service, no equipment storage etc.

## *2.10. The SPORT project compared to the BOSS project*

During years 2004 – 2006 an EU/Tacis funded project BOSS (Baltic Oil Spill Safety System, Russian Federation) was carried out by a joint Danish – Finnish project group. The main beneficiaries in this project were:

- The State Marine Pollution Control, Salvage and Rescue Administration of the Russian Federation
- Baltic Salvage and Towage Company
- Specialised Maritime Inspection
- Regional Centres for Emergency in St. Petersburg and in Kaliningrad
- Leningrad Oblast, Kaliningrad Oblast and St. Petersburg authorities

One of the work packages in the project was "Feasibility Study for a Joint Coordination and Information Centre" The objective of this target was to enhance co-operation between Baltic Sea countries and the Russian authorities on monitoring of and reaction to oil spills through institutional strengthening. In order to reach the objective a feasibility study for a Joint Co-ordination Centre was prepared.

The study showed that there is need to enhance and develop information change and cooperation between those many Russian institutions and authorities, which are responsible for oil spill response, prevention and monitoring in the Russian Baltic. Several possibilities to establish a coordination and information centre were evaluated and to enable the centre's start, a step by step approach has been proposed.

Based on the findings during the project the centre’s main duty is to assist different authorities by collecting, analysing and delivering information about oil spill preparedness and in case of oil spills and also to act as a link between different authorities involved. The centre should at least in the beginning have neither operational duties, nor equipment for spill response. In order to work effectively and to be able to assist in all circumstances, the centre should have the possibility to work 24 hours per day, seven days a week.

The list of main duties of the centre when it is operational and in final shape is as follows:

- general information service
- inventory services
- consultancy services
- training control services
- exercise services
- surveillance and reconnaissance analyse services
- oil drifting prognoses and drifting risk scenario services
- oil type definition services
- maritime situation information service
- management guidance service
- information gathering and distributing services
- mapping services
- evaluation, assessment and auditing services
- chemical data services
- legal and administrative guidance service
- net – benefit – analyse services
- international operative cooperation services
- operational command centre services
- development, research and testing services
- equipment storage services

The training control services in the planned BOSS centre consist of supervision of the training activities in Russian federation, authorising and certifying their work. It can also assist operational authorities and other actors as well as supervising authorities in that respect. Development, research and testing services are for benefits of operational authorities when selecting equipment and for permitting authorities when approving methods. In later stage the equipment storage can be incorporated to the centre. The equipment storage services may then the help different operative actors to strengthen their efforts for preparedness of oil spill response.

Thus there is only slight overlapping in few of the duties of the BOSS centre and the SPORT centre. The BOSS centre is planned to assist in response preparedness and in operations, SPORT is mainly concentrated in training response personnel of different authorities and entrepreneurs. If both centres can be realized as planned, cooperation and well defined division of duties is needed. The centres could then substantially improve the oil spill response preparedness and capacity in North – West Russia.

## *2.11. Lessons learned from the Finnish SÖKÖ project*

In Finland the Regional Rescue Services (RRS) are responsible for organising on-shore clean-up with the assistance of the Regional Environmental Centres (REC). These oil combating authorities of the Kymenlaakso region in Southeast Finland have developed a thorough preparedness manual for oil incidents with the help of SÖKÖ – Management of on-shore oil combating - project (SÖKÖ). SÖKÖ, innovated and administrated by the Kymenlaakso University of Applied Sciences (KyAMK), produced a detailed guidebook for oil combating authorities and the response commander (RC). The scope of the guidebook was achieved as an interdisciplinary effort between educational institutes, rescue services, environmental centres, authorities, civic organisations and businesses.

The SÖKÖ-guidebook (Halonen, 2007) provides information for oil combating authorities on how to create and finance an oil combating organisation in case of a massive oil accident. In “normal scale” oil incidents the recovery is carried out by the response resources determined by statutory contingency obligation i.e. the authorities itself. SÖKÖ plan is taken into use when extra resources are needed. After an incident, oil recovery operations in the high priority areas begin immediately with existing oil combating organisation of RRS. Simultaneously, the authorities begin to build up the SÖKÖ on-shore oil combating organisation. This may take time between 2 and 4 weeks. Organisation will consist of authorities, businesses and volunteers. The Kymenlaakso RRS estimates that on-shore oil recovery in the region may employ 600-1000 persons (Tolonen, 2008).

The guidebook provides detailed information on how to conduct oil combating in case of a major oil incident where the oil reaches the shores. The guidebook is used as an action plan, as a manual for the response commander (RC) as well as for training both authorities and volunteers. The model developed here for the shoreline activities describes how to manage the transportation of oily wastes, the oil combating equipment and personnel by road and by sea. In addition, the methods for loading and discharging of oily wastes as well as transportation routes and equipment are examined.

The guidebook discusses the oil combating organisation and the management, the human resources, the communication and the financing issues. The guidebook also covers the arranging of cleaning operations, the oil combating equipment and the temporary storage sites in the mainland and the archipelago and the construction specifications for the temporary storages (Halonen & Pascale 2008). Transportation of oily wastes was also examined including the methods for loading and discharging oily wastes, as well as the sea, road and railway transportation methods using a database for estimating the best and most economic routes from the archipelago to the mainland. In addition, detailed operative charts were produced, with indications of the cleaning sectors and the oil waste transportation spots.

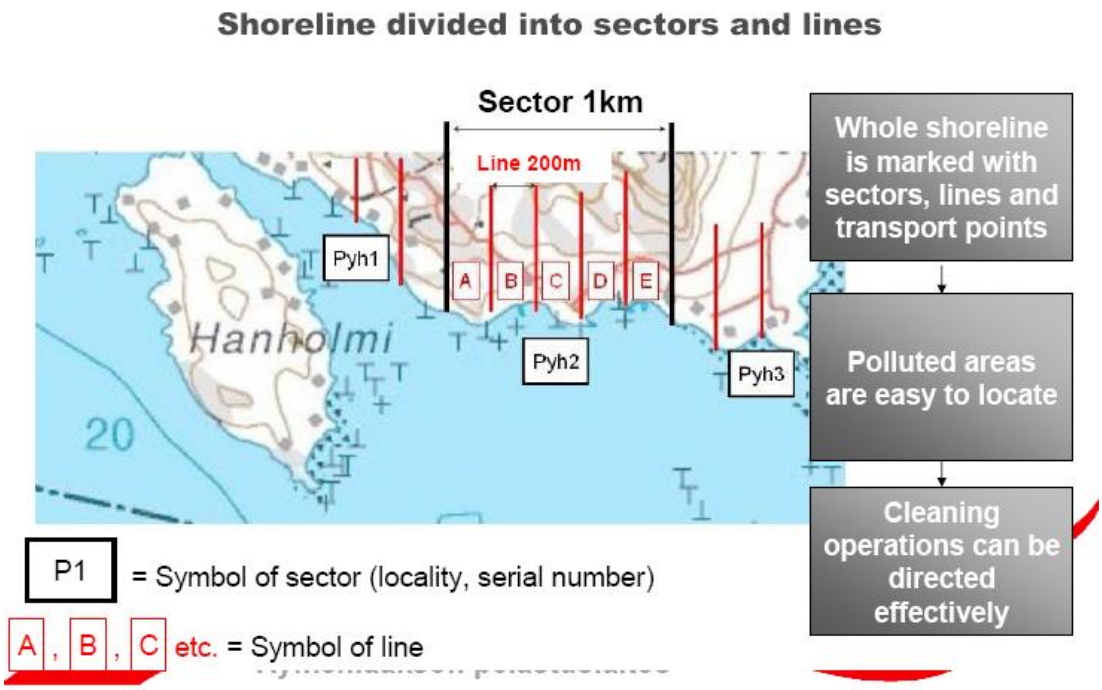



*Figure 10. A schematic presentation of the SÖKÖ reconnaissance plan for the operative planning (Tolonen & Halonen, 2008).*

The content of the guidebook includes ten different packages suitable for training and education purposes, and has briefly described in Appendix 3. The SÖKÖ structure is also shown in Figure 11.


*Figure 11. Work Packages of the SÖKÖ model (Pascale 2008).*

The SÖKÖ I project was completed in the end of the year 2007. The operations model for oil spill management has proven to be successful and the other regional rescue services have shown their interest in the results of the project. Therefore expanding the SÖKÖ model to concern the whole coastal area in Finland is already underway, the extension of the old model continuing up to the year 2011. Three new regional guidebooks will be produced, one for each area covering partly same issues as in the Kymenlaakso version developed in the first SÖKÖ project.

In addition, one common guidebook will be produced bringing together all four SÖKÖ areas' compatible contingency planning. Additional work packages will be starting off, such as studies on possible official procedures that could delay the response and transportation of injured animals. The cooperation with neighbouring nations is fundamental in the at-sea as well as the on-shore combating. At present SÖKÖ is focusing on improving the national response.

## *2.12 Aspects from foreign centres that should be taken into account at the St. Petersburg Oil Recovery Training Centre*

The Norwegian model is well working, but far too complex and expensive for the St. Petersburg centre, because most of the operational duties are already covered by different Russian authorities. This solution, if adapted in Russia, needs changes in Russian legislation.

There are certain advantages in the Norwegian concept like:

- the well organized training for oil spill response personnel around the whole country.
- VTS and pilotage centres are in the same building as the oil spill response headquarters
- the possibility to test equipment and methods with oil in a special test basin.
- the intensive cooperation with the research institute SINTEF, which can offer consultancy and laboratory services to the centre.

Cedre in mainly concentrated on research and development and there are already many excellent institutions in Russia for that kind of activity. Cedre can however provide valuable information also to Russian authorities.

OSRL is a purely commercial centre concentrated on helping its shareholders, members and also other countries and companies in oil spill response operations. If offers also a vide range of other services like training, contingency plan development, audit undertaking etc. The services of OSRL can be used also by Russian authorities.

REMPEC is mainly a coordinating and information centre. It can in case of accidents only act as a consult without any material help. The institution also organizes training, but its focus is understandably the circumstances of Mediterranean and the needs of the Mediterranean states.

OHMSETT is one of the largest test facilities in the world and a perfect place to test skimmers, booms etc. The operational training can be performed only in the basin, but OHMSETT has a diverse selection of oil spill response courses in classrooms.

The Finnish centre will at least in the beginning concentrate on taking care of oil spill response material, its maintenance and its storage also in all depots of the Finnish Environment Institute on the Finnish coast. The training of oil spill response personnel of the Finnish rescue services areas will be also one of the main tasks of the centre.

Generally it can bee seen, that in order to achieve the goals for the training centre, there must be possibilities to practice in near real circumstances. Thus the centre needs to have a test basin with a wave generator for testing and practicing the use of skimmers and booms, enough open space for spreading out booms and testing power packs, and preferably also a shoreline outside the centre for practicing with response equipment also at sea. These all in addition of classrooms equipped with modern IT and AV devices and functions.

It depends on the Russian legislation, if it needs to be IMO accredited to provide IMO training courses.

# 3. Analysis of requirements

## *3.1 International requirements*

### 3.1.1 IMO model courses

There is no international, commonly accepted model for oil spill response training courses. Most countries have developed their own systems for training or used IMO

model courses. The latest version of IMO courses is from 2006 and named "Oil Pollution Preparedness, Response and Co-Operation (OPRC)". It is available in electronic form.

These IMO model courses on oil pollution preparedness, response and cooperation (OPRC) have been developed to provide guidance, primarily to developing countries, for preparedness and response to marine oil spills from ships. Collectively, the selection of courses has been designed to address all aspects of oil spill planning, response and management. Each course includes a course director's manual, a participant's manual, PowerPoint presentations for each course module and a course certificate.

The course package includes three courses:
- OPRC Level 1: First Responder (Model Course 4.02)
- OPRC Level 2: Supervisor/On-Scene Commander (Model Course 4.03)
- OPRC Level 3: Administrator and Senior Manager (Model Course 4.04)

IMO model courses use the tiered concept, which divides the needed actions according the size of the accident, oil release:
- Tier 1 is normally associated with small local events for which response resources should exist locally (private or municipal preparedness)
- Tier 2 spill is a larger spill than Tier 1. Response is needed from both private and municipal/intermunicipal (oblast) preparedness.
- Tier 3 response is dimensioned for the largest spills, such as large tanker accidents or offshore blowouts. Tier 3 arrangements will usually call for all oil spill response resources in the nation and may also call for international assistance.

### 3.1.2 Norwegian concept

The training activities in the oil spill response field of the Norwegian Coastal Administration are directed to two different target groups.
- the Standard Training Programme is based on the training requirements within acute pollution of the municipalities, the Coast Guard and other governmental authorities
- the Special Training Programme is based on requests by foreign aid organizations, the private industry or foreign authorities/ organizations

The Standard Training Programme for oil spill response is divided into four different segments:

**Administrators and Senior Managers (4 days)**
Highlights the national level problems caused by oil pollution of the marine environment and the complex management decisions required during a significant event. This course corresponds to IMO Model Course level 3.

**On-Scene Commanders/Supervisors (5 Days)**
Provides the basic response strategies and tactics as well as the organisational planning skills required of operational staff to deal with major oil spills.

**First Responder (5 Days)**
Provides the basic response techniques for recovering spilled oil and cleaning polluted shorelines.

**Train the Trainer (5 Days)**
Provides the basic training knowledge and skills required to deliver an oil spill response training course.

**Special training programme**
Training courses adapted to suit the client needs. The basic elements are:
- theoretical training
- practical training
- table top exercises
- practical (field) exercises
- combinations

## *3.2 Russian national requirements*

Training of specialists for oil combating operations in Russia is regulated by several legal normative documents (see Appendix 4). In accordance with these legal normative documents mandatory training courses must be carried out only for the personnel of certified Emergency Rescue Services (ERS) and Emergency Rescue Groups (ERG) (Federal Law №151, Qualification requirements). One of the mandatory conditions for primary and periodic certification of ERS and ERG is personnel training and retraining.

There should be special training courses for specialists and for rescue staff. Under the term of rescue staff is considered personnel, which should get special training according to the programme of rescue staff operators, fulfilling the requirements of health condition and certified in due course. Rescue staff is a core part of ERC and ERG. Programmes of the training for rescue staff include issues of oil combating operations and carrying out rescue operations. Programmes of the training for oil combating specialists include only issues of response to oil and oil product spills.

To regulate of training, the Ministry of Transport of the Russian Federation issued the Decree №BP-28-p on 27.03.2002 about the creation of the training system, higher qualification training and retraining of the specialists who combat oil and other dangerous substances at sea. In accordance with this Decree, the Ministry of Transport approved model programmes for specialist training for oil combating operations. Besides that, model programmes for training of rescue staff of Federal Transport Control Agency and EMERCOM of Russia were confirmed and approved.

Programme content of the courses for specialists and for rescue staff is absolutely the same in the part connected with oil spill combating operations. Basis for both of these sections is based on model courses of International Maritime Organization (IMO) for oil combating operators, on scene commanders of the place and high level administrative personnel.

However, in comparison with model courses of IMO, the model programme are more extensive due to the practical training of the personnel working with different types of oil combating equipment and participation in hands-on exercises and practical courses on the special training simulator for oil combating.

Training of the personnel on oil combating courses is mandatory and carried out before initial accreditation of ERG/ERS to get permission for emergency response activities. Besides that, they should carry out upgrading training at least once every three years for periodical accreditation.

In that way, specialists and rescue staff for oil combating are obliged to have training or upgrading training courses for oil combating operations at least once every three years.. Specialists and rescue staff for oil combating are divided on three levels in accordance with their own function responsibilities:

**Personnel of the 1st level** – Personnel involved in direct operation oil spill response equipment.
**Personnel of the 2nd level** – Team leaders, on-scene commander, members and head of operational staff headquarters.
**Personnel of the 3rd level** – Senior administrative personnel involved in management response operation in case of large oil spills (municipals, regional or federal levels).

In that way, there could be formed several levels in the oil combating personnel training: basic (primary) training, upgrading training and hands-on training. (Figure 12)

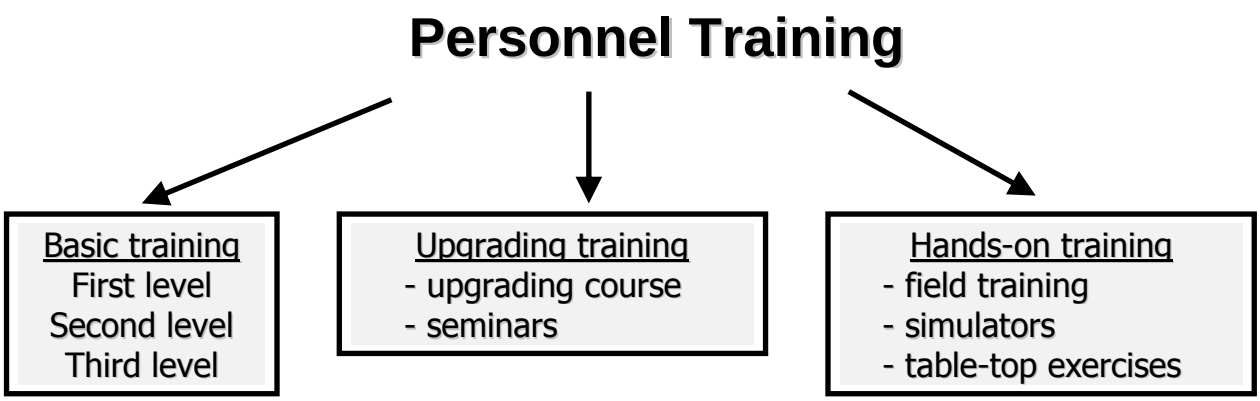



*Figure 12. Proposed training classes in Russia.*

All programmes of the personnel training include elements of practical training and working with oil combating equipment in close to real conditions. The most convenient it would be to arrange the training in the training ground and the test tank.

# 4. ST. PETERSBURG OIL RECOVERY TRAINING CENTRE

## *4.1 Organisation required*

### 4.1.1 Basic Mission

The main aim of the SPORT centre is to form training facilities for the practical hands-on training of the personnel for oil and oil products combating operations. To reach the aim the centre should be equipped with oil recovery and combating tools of different types and forms. Quality and quantity of such equipment should be enough for containment and collection of small quantities of spilled oil products. In addition, the SPORT centre should have enough equipment for the full cycle of oil combating works – from deployment equipment to cleaning and storaging the equipment at the end of the operation. It needs to be considered that the equipment used for training purposes could be used in real situations for oil combating operations on the coastal zone.

Thus, functions of the SPORT centre could be enlarged to function as a storage place for oil combating equipment for emergency response purposes.

A supplementary function of the SPORT centre could be to use its facilities for the purpose of testing equipment in different conditions. This function could be very useful and it is needed by different national and international organizations for producing equipment, preparing plans for oil combating operations for companies, for making recommendations on selection and forming sets of necessary equipment and their number for the purpose of providing the most efficient reaction to oil spills, used in the different working conditions of ERG.

Technical basis of the SPORT centre could be used also for different scientific and research works in the field of environmental protection and oil spill prevention and combating at the Baltic Sea.

In general, the SPORT centre could be used for training, for research purposes, as well as a storage place and for testing equipment for oil recovery and combating operations, which could be used in actual emergency situations. Despite the wide range of functions, the main task of the centre should be the practical personnel training.

## *4.2 Conceptual design and performance criteria*

### 4.2.1 General

Construction of the SPORT centre is necessary because of the absence of such a centre for practical training in North-West region of Russia and because of a strong demand for such practical training for the oil recovery and combating personnel.

The existing system of training and upgrading training for the personnel of ERG/ERS is based on the IMO model courses and model training programmes of specialists and rescue staff for oil combating. In this system practical training is a weak chain because of the absence of such a training centre nearby.

Nowadays practical training is carried out on the territory of large functioning ERG/ERS. In St. Petersburg, for example, such training is carried out in the area of Baltic BASU. Use of functioning sites of ERG/ERS has serious limits because of possible organization process and use of technical tools. There is also equipment which is used for bearing preparedness for response operations and spread where needed. Port waters of the ERG/ERS basin area are actively used for special cargo transfer and bunkering operations as well as for navigation purposes.

Thus, during practical training it is not possible to make a spill for training purposes and recovering and collection of oil products, which is an essential part of the practical training. Practical training should be carried out as the most efficient form of training. Besides this, it is not possible to work with different types of oil products, in different conditions of waves and currents and in different types of coastal lines and areas.

In order to overcome these problems with practical training of personnel and to create conditions for the most adequate use of tools and equipment for oil combating the training centre needs to have conditions similar to real life situation with the test tank/pool and other facilities.

### 4.2.2 What is the purpose of the centre, target groups and main tasks of the centre

The aim of the creation of the SPORT centre is to form a base for the practical training of different categories of specialists and for the use of special equipment for oil and oil products combating and recovery. The centre could be the answer to the wide range of questions connected with education and training, research and constructor work and activities, as well as for accidents of oil spill.

Practical training in the centre could be offered to different categories of specialists from the personnel of Emergency Rescue Services and groups to volunteers, which could be attracted to help in oil recovery.

Main target groups for the training in the SPORT centre would be:

Personnel of the 1st level – responders, e.g. specialists who use oil recovery equipment directly during an accident. To this group belong regular professional personnel of ERG, specialists on oil combating activities in enterprises connected with use and transfer of oil, and which have plans of oil response operations. This group is the biggest category of specialist which has to get such practical training for certification and for getting access to oil combating activities.

Personnel of the 2nd level – operation leaders, e.g. leaders of ERG, heads and members of coordination staffs for oil combating operations at accident sites. This category of specialists is responsible for choosing and equipment acquisition and resources for response and their location at the accident site, starting of the operation and change of resources for the efficient ones, as well as providing safety for the personnel.

Personnel of the 3rd level – leaders of ERG, e.g. who make decisions, heads and members of commissions for Emergency operations and leading the main staffs of oil combating operations. Specialists of this category are responsible for decision-making for strategies and tactics of operations for oil recovery and combating, start and finish of operations and general organization of activities and interconnection of all participants.

A special category of trainees are the volunteers who usually assist by cleaning beaches and coastal areas in case of serious accidents.

There should be a special programme of the practical training planned for each category of trainees according to their responsibilities. All these categories should have a course module for human safety in oil spills combating operations.

The preliminary number of the personnel to be trained in the SPORT centre could be estimated from the general amount of enterprises in St. Petersburg and Leningrad oblast, which are connected with oil provision (Figure 13). The amount of such enterprises in St. Petersburg and Leningrad oblast is 799, according to the statistical data of North-West regional centre of EMERCOM.

In accordance with the legislation of the Russian Federation all these enterprises must have plans for oil response operations. In order to provide preparedness level and oil

response operations in accordance with these plans they should be done by Emergency Rescue Services.

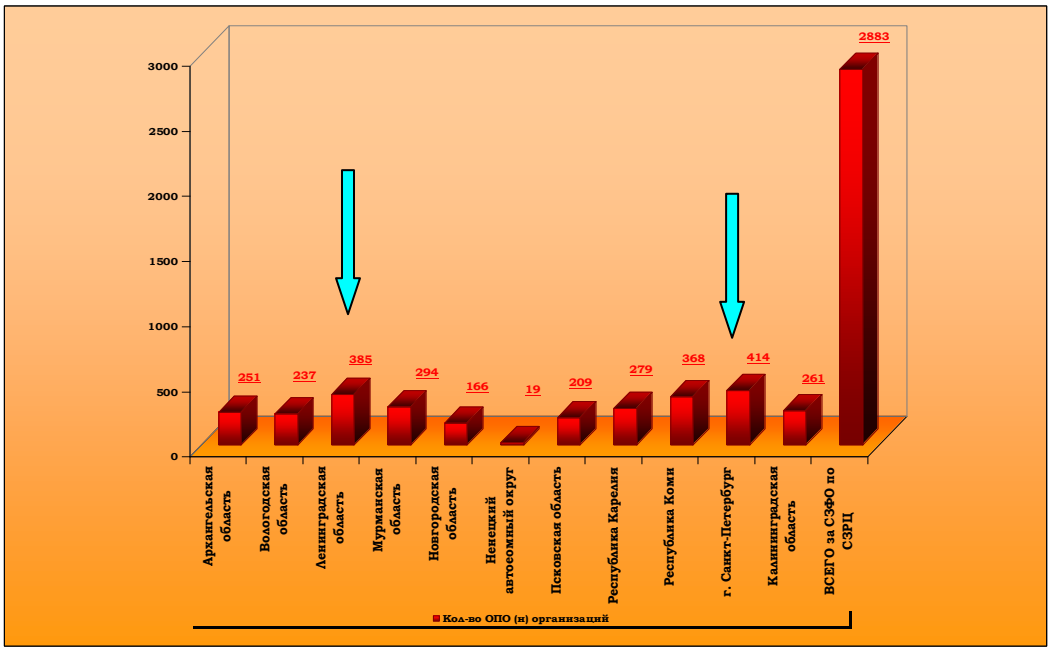



*Figure 13. The number of oil-supplying companies in North-West region of Russia.*

But as shown in the diagram (Figure 14) only 20 of ERS in St. Petersburg and Leningrad oblast are able to carry out oil response operations at the present time. In fact it means that the system of ERS/ERG is in the process of development. In coming years the process of creating new ERS/ERGs for professionals and volunteers and their development will progress rapidly. Besides this one of the urgent elements of ERS creation will be practical training and upgrading of training for the rescue staff. Majority of the personnel, about 80-90% would be personnel of the 1st level. Up to 10-15%of the personnel would belong to the 2nd level, and 5% of the personnel to the 3rd level. The amount of new ERS/ERGs created could be up to 100 groups. And in this case the number of the trainees for the SPORT centre could be up to 2000 persons.

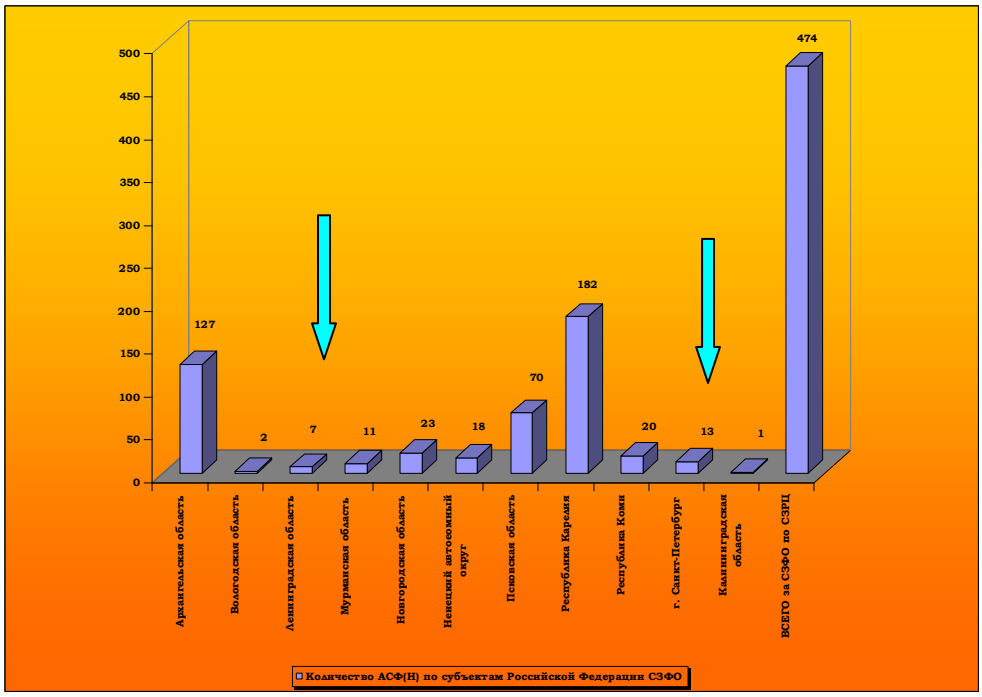



*Figure 14: The number of Emergency Rescue Services in North-West region of Russia.*

According to the estimation, the general turnover of the SPORT centre could be about 500 persons per year (e.g. 300 persons on Makarov Academy courses and 200 for commercial training) for the first stage. It corresponds with the average number of trainees on the courses for specialists in Makarov Academy Training Simulators centre. The load of the SPORT centre could in fact be different and it depends on the efficiency of the control system for oil response operations in enterprises and legislation requirements for providing the preparedness level.

Training of the personnel should be organized in groups. The number of trainees in the group is determined by the technical limitations of the pool (test tank), storage room facilities and equipment used and instructors working in the centre. There are no restrictions and limits for the number of trainees in the groups. However, it is learned from experience that the optimal number of trainees is 8-10 persons in a group with one instructor. It is possible to organize training for 2-3 groups on different sites at the same time. Limitations of the number of groups having training at the same time is determined by the number of instructors working in the centre and the number of the rooms/sites for training (a pool, storage facilities, study room, inner yard and water). In this case the maximum number of trainees at the same time could be up to 30 persons.

## 4.3 Proposed site for the Training Centre

### *4.3.1. General*

For the design work the St. Petersburg City Administration defined a land area in Krasnoselsky district shown in Figure 15. The area under consideration is located nearby the

Vodokanal's water treatment unit having an access to the Gulf of Finland. Thus the area is suitable for terminal and dock design, and has a proposed highway access.


*Figure 15. The satellite (Google Earth) photo of the planned construction site. The Training centre's location is proposed to be on the right embankment of the small man-made pond (in the middle of the photo).*

The preliminary layout of the area for the training centre purpose is shown in Figure 16.

Here a new road and bridge construction have been made crossing the dredged channel to the Gulf of Finland. Berthing places for the recovery fleet are situated beyond the bridge – closer to the Gulf of Finland shoreline. All other premises and the slipway for the dry dock have been designed close to the small bay area and existing Vodokanal facilities.

The training centre building is situated in the middle of the existing square on the right-hand side of the small (dredged) bay. Other necessary depots and terminals such as:

- slip facility for the dry dock
- dry dock for vessels' winter storage and repair
- container depot
- vessel repairing area,
- parking place etc., see Figure 16.

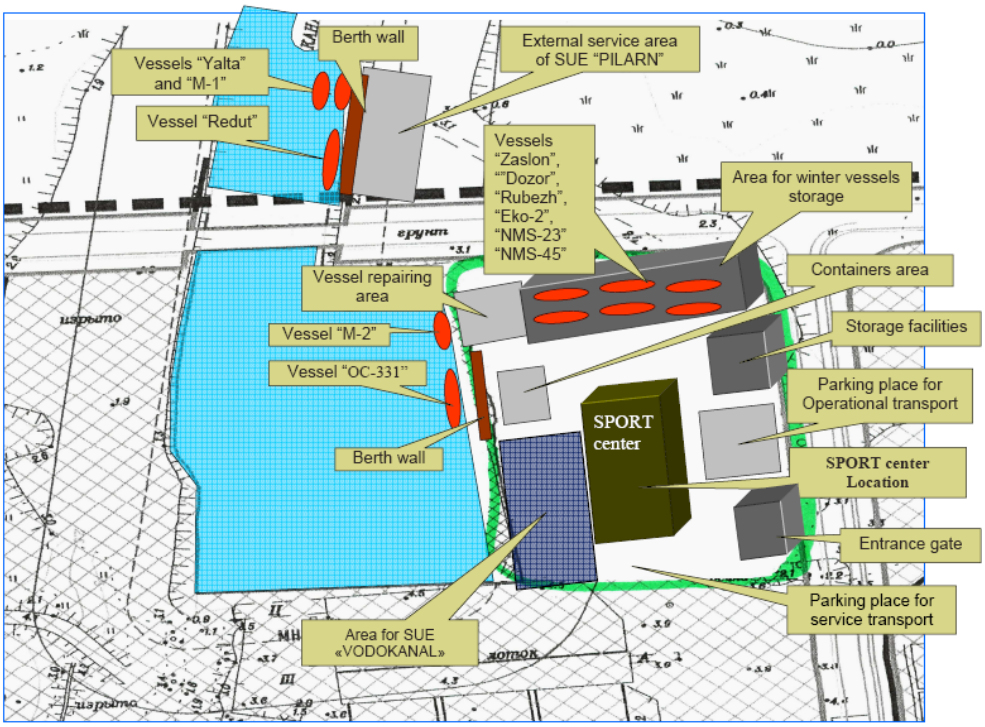



*Figure 16. The layout of the proposed SPORT centre area.*

## *4.4 Indoor facilities of the training centre*

Based on the preliminary evaluation of the training centre the number of the permanent staff is close to 9–10 persons. The administrative staff required is three - four people consisting of the following persons:

- head of the recovery and training centre, who requires a room with standard office equipment and an additional space for meetings
- economist-accountant
- secretary of the centre/director
- training supervisor

Detailed identification of the personnel required is shown in Chapter 4.7.

The detailed description of the technical performance specification of the training centre is shown in Appendices 5 and 6. However, based on the above-mentioned analysis of the training potential, the main building should be designed for the carrying capacity of 500 persons to be trained per year with the maximum simultaneous group capacity of 30 persons. The staff of the centre is estimated to be 9–10 persons. The main facilities for the training centre are:

- main interior hall
- training classroom for 20 persons
- laboratory room(s)
- test tank hall
- subsidiary rooms
- technical service rooms
- outdoor facilities with depots and relevant supporting facilities

### 4.4.1 Main interior hall

The main building is planned to have three floors and to contain rooms and facilities defined in Appendices 5 and 6. The architectural design of the building should ensure the technological scheme of the training process and the easy use of the centre. The exterior of the centre has been proposed to follow a modern design with fine tiled walls. The good material choice is also important for the cleaning. Ceramic granite cover material is proposed for the main entrance hall and the suspension ceilings. Shower rooms and toilets will also be covered with ceramic granite-like material with suspension ceilings.

### 4.4.2 Training classroom(s)

The building of the SPORT centre should be used for administrative and study purposes. Carrying capacity of the centre is 500 persons per year. Maximum simultaneous capacity of the centre is up to 30 persons (for 2-3 groups of 10 persons each).

The training classroom(s) should be equipped with standard educational equipment, tables and seats and pc facilities suitable for 20 persons at a time. Typical functions to be arranged during training and education sessions are:

- preparatory lessons by experts and staff of the centre with demonstrations and material supported by chalk/flap board, video presentations and overhead projector. Standard multimedia facilities for classroom purposes are proposed here.
- simulated exercises run by the computer-based simulator programmes supported by tailor-made screens and communication facilities. These exercises are directed for communication, information sharing and management type of lectures. The facility could be connected to the existing alarm and communication system of the response organisation, thus giving the possibility to use the facility's communication facilities as a sub-command station during real oil spill recovery situations.
- library space with handbooks, catalogues, service manuals, charts etc. to support the activity

### 4.4.3 Laboratory room(s)

The laboratory room is required for quick and standard testing of oil parameters (optional) or to define critical oil recovery efficiency parameters from the oil samples. Typical testing required to evaluate the recovery efficiency are:

- the amount of recovered oil
- oil/water pick up ratio
- oil viscosity
- oil-water emulsion capabilities
- oil in water
- oil fingerprints, content of the oil (weathering studies)
- density of oil
- specific gravity
- oil-soil-water interaction.

Thus the facilities should contain the standard laboratory facilities with a special ventilated chamber, a weighing device, thermometers, devices for density measurement, a UV/visible spectrophotometer, a viscosimeter, a purge-and-trap system for gas phase

chromatography, gas chromatography coupled with a mass spectrometer with an SBSE multifunction injection system, High Performance Liquid Chromatography (refractive index detectors and diode array).

The laboratory may also have facilities for:
- efficiency tests conducted as a part of response product validation (dispersants, sorbents and washing agents) and carried out according to standard test procedures
- specific tests for experimental studies in the case of major pollution incidents. A large number of different measurements (qualitative and quantitative), mainly for hydrocarbons but also for a wide variety of chemical products can be taken using a wide range of analytical equipment.

If testing needs to be carried out at controlled temperatures, air conditioning with automatic adjustment system is required. However, a laboratory room with standard indoor room temperature and large enough cold room (fridge) facilities for sample storaging and analyse purposes may be sufficient.

Furthermore, the laboratory should also be equipped with field-based equipment to continuously take measurements of the water and air (SF-UV and PID).

*Figure 17. Analysis equipment by GC/MS equipped with an SBSE multifunction injection system (Cedre).*

### 4.4.4 Indoor test tank hall

One of the main directions for the practical personnel training in the proposed SPORT centre will be training on how to carry out activities on water. In this case, the term “water” means seas and inland water ways like rivers, lakes, artificial waterways, etc. An indoor pool is proposed for modeling of situations and conditions for carrying out activities.

The requirements of the pool for training and oil combating operations are determined on the basis of analysis of the most probable scenarios for oil combating operations on

water. In connection with this, there should be systems for making waves and different types of currents in the pool.

As providing real actions for oil combating operations, an important task is the protection of the coastal area, so different types of coastal zones (sandy, stone, berths) must be simulated in the pool (sandy coastal, sandy-stone, stone coastal areas and berth-wall).

That is why a wave-making machine, a system of wave suppression, a water current-making system and a system of making an air flow above the water surface must be the pool's imperative elements. It is essential to foresee the opportunity for usage wave suppression system on request. There is a lot of literature available on wave makers and absorbing beach design. Reference (Longo) for example gives an idea of a towing tank wave maker design. Typical wave maker systems for testing purposes are piston types, hinged types, plunging types and pneumatic wave makers. Piston type is often used in shallow water basins and flumes while wedge type plunging types are used in deep water basins. Hinged structures are also used in deep and semi-deep basins. Hinged structures are perhaps more complicated to design due to the sealing demands between the moving wave plate (stroke plate) and the basin walls. Figures 18–20 show some facilities in use.

One of the pool's sides must be flat. One part of the flat side should be faced with stones of various forms and sizes and the other part should be a sandy coastal area (beach). Other sides of the pool can be common vertical walls (imitating berths). The walls of the pool must be equipped with elements for bonding of boom fences and various types of skimmers.

In addition to provide fine water treatment, the pool must be equipped with oil-water separation system.

For loading/unloading skimmers in and out of the pool, it's essential to have weight-lifting devices placed either stationary by the pool, or on the loaders. Use of mobile forklifts is preferred, because it allows using it wider in the centre.

The size of the pool should be enough for deployment one section of boom fences and for using 1–2 oil skimmer devices simultaneously. So the size of the pool should be no less than 10 x 20 metres. The maximum size of the tank is close to 20 x 40 m2. The greatest depth should allow to place sea booms of 1–2 metres overall height. So the greatest depth of the pool must be no less than 2 metres. The height of the tank in relation to the water depth is also an essential design factor. A minimum of 0.5 m wall height above the still water level is required.

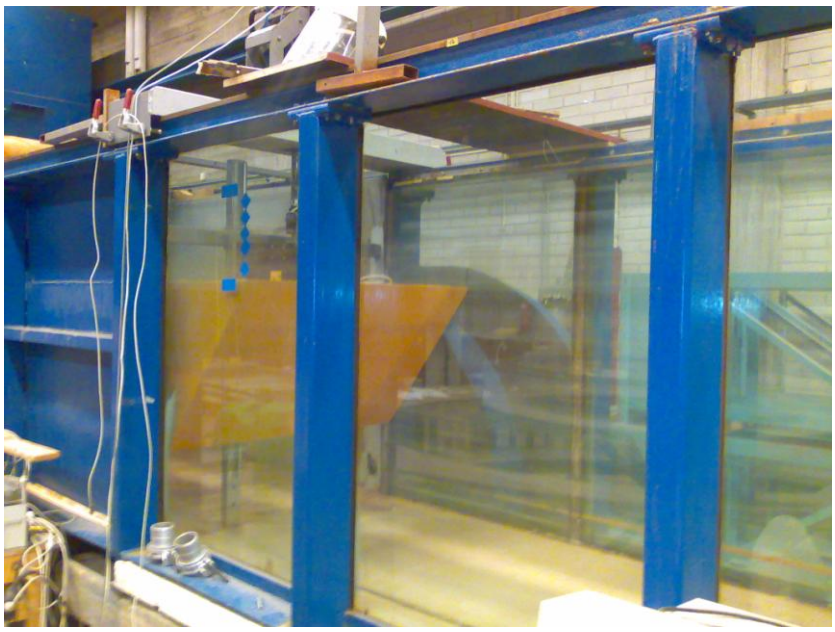


*Figure 18. The big flow flume in the Hydraulic laboratory of the Helsinki University of Technology (HUT, Finland). The yellow wedge is the plunging type wave maker. Flume size 1.1 x 1.5 m, length 50 m.*

*Figure 19. The oil/water testing flume of the HUT Hydraulics Laboratory (Finland). glass side windows and flow/current formation facilities on board.*

*Figure 20. Hinged type wave maker in Horten's test/training basin.*

The wave tank room can also be equipped with a separate flow flume facility for oil water interactive studies. The system should be small and movable, thus it could be used outdoors close the test hall for studying oil under ice. Flow flumes are standard devices in hydraulic laboratories, and their form is usually long and straight or round in horizontal level (See Figures 21 and 22). There are also special vertical types of flow flumes, cavitation tanks or special flumes to produce uniform flow patterns in a small and restricted testing champer. These facilities are too sophisticated and expensive for oil training centre's purposes, but the standard flow flume could give additional value for the training and testing activities.

*Figure 21. Movable flow flume at Cornell's Joseph de Frees Hydraulics Laboratory (USA).*

*Figure 22. Flow flume at Wallingford (UK).*

Finally, there are oil testing laboratories equipped with small tidal flow simulation systems. Usually the system consists of a table with a set of water/soil pools for tidal cycle studies in shoreline conditions. The hydraulic or electric actuators are lifting the system in a pre-defined way, thus simulating the tidal variation in shoreline conditions. System needs separate water in- and outlet systems and measuring and sample taking facilities. Typically devices are used for oil-soil interactive studies, sorbent studies, dispersant and biosorbent studies.

Thus the following main list of main requirements can be drawn:

Main Test tank:
- pool size between 10 x 20 m2 and 20 x 40 m2
- water depth 1,5–2,0 m
- wall height over 50 cm above the still water level
- wave maker device attached at the end of the tank
- hinged or plunging (wedge form) wave maker recommended
- wave damping beach which can be used both for wave absorbing and man-made sand/gravel shoreline studies with waves and oil
- enough lifting capacity for lifting up and down equipment for testing/training in the pool
- water circulation system (an option) by ejector principle (pump system)
- water-oil separation facility
- electric, pneumatic and hydraulics supplies (actuators, working machines, pumps etc.)
- cleaning facilities
- water inlets and outlets
- ventilation
- automatic alarm system for controlling hydrocarbon content in the air – explosion protected electric facilities and lights
- standard measuring system and control room.

Flow flume:
- 6–10 m long flume with partial glass walls
- straight form or round facility
- typical height 0,5–1,0 m
- typical width 0.5–1,0 m
- typical range of water velocities 0–1,0 m/s

Tidal Bed table
- for tidal studies
- hydraulic or electric motor-driven actuators
- system for simulating vertical movements in shoreline conditions
- water supply system with automatic adjustment for tidal cycle simulations
- special glass or stainless steel basins for testing
- water inlet/outlet system with pumping devices
- monitoring and sample taking systems

### 4.4.5 Subsidiary rooms

Subsidiary rooms:
- director's office,
- administrative staff's office,
- instructors' room,
- technical and service staff's room;
- locker-rooms for men (20 persons) and women (10 persons) with toilets, shower rooms and sauna,
- toilets for visitors according to sanitary norms and standards,
- inventory room (for storage of working clothes, inventory and materials);
- storage facilities for oil recovery equipment
- mineral oil depot (outside the building)

Technical services rooms:
- water-measuring unit,
- heating unit,
- electrical control unit,
- air ventilation/climate control shaft according to standards,
- charging station for electric loader,
- pump-house of the test tank/pool with full scheme of water treatment (pump units, filter equipment, equipment for water treatment, heat-exchange equipment, reagent equipment),
- local waste water treatment facilities for oil and suspended substances refinement.

## *4.5 Outdoor facilities*

### 4.5.1. Outdoor basin

There is no need to create an outdoor basin on the territory of the centre due to the weather conditions in St. Petersburg and difficulties for further maintenance and its use. However, the man-made dredged pool outside the main building with the support dock yard, pier etc. facilities offer an outdoor room for many training purposes. Testing of skimmer performance, flotation and booms can be carried out in the sheltered basin even if the offshore wind velocities and wave conditions are too severe for outdoor exercises. These excercises are carried out with the staff and facilities, and without oil.

### 4.5.2 Facility for in situ burning

Method of oil burning on the place of the spill is an alternative to mechanical methods of localization and collecting oil. This method can be very effective especially in oil recovery activities in icy conditions. Before applying this method a number of factors and restrictions that makes implementation of this method not rational or unfeasible must be considered. Additionally, for successful and safe application of this method, specialists must have definite knowledge and skills in technique of ignition oil slicks and fire location monitoring.

Training of specialists on how to use in situ burning method must be one of the necessary elements of the practical training. There must be a place for practical training of burning oil on land and sea in the SPORT centre.

In order to implement the method of burning oil spilled on the surface of water, it is essential to create conditions of oil spreading on water and in terms of ice with variable ice concentration extent.

As an experiment ground for carrying out practical training can be used trays for water and soil, so that oil spill and its interaction with different objects (ice, snow, barriers, garbage etc.) can be shown and studied.

Taking into account the big amount of smoke and soot forming in the process of burning oil, the place of the training should be equipped with a smoke absorbing system so that while carrying out training all the smoke is absorbed completely by a system of smoke catching and filtrating.

In order to burn oil safely, the place of the training should be equipped with tools for fire extinguishing, which will be efficient in extinguishing burning oil.

### 4.5.3 Site for equipment use, tests and demonstration

As mentioned before, the main goal of the creation of the centre is organizing and carrying out practical training for specialists in using different types of equipment for oil combating operations in real-like conditions. Therefore all the equipment used in oil combating should be presented in the training centre.

Additionally, it is essential to provide conditions not only for training skills in using equipment in the centre but also for cleaning it after use, repairing, storaging and transportation to the accident site.

Although, it seems that it will be possible to use the centre not only for training personnel in effective use of the equipment, but also for carrying out tests and experienced exploitation of new patterns technique for oil combating. This work may become an essential part of the training centre’s daily activities not only for Emergency Response Groups in the North-Western region of Russia, but for all organizations working in oil recovery and oil spill prevention in Russia and the whole Baltic Sea region. The nearest centre working in the same direction is situated in Horton (Norway), and it is already carrying out such work for specialists from Sweden, Finland, Denmark and other countries of the northern sea region. Not only could the producers of this equipment but also the final consumers be interested in the results of this work.

The SPORT centre can also be used for demonstrating methods of equipment application in different conditions. Therefore the centre's technical capacities can be used for carrying out practical seminars for specialists and the site for oil recovery and combating equipment and techniques demonstrating.

Carrying out operations of oil spills responding on water is connected with using various ships and oil recovery equipment bearers. In the practical training of specialists for oil recovery and combating, the goal is to teach people how to operate with oil combating equipment and to use modern technologies.

The key points of the practical training are: Choosing equipment in conformity with the conditions of the response operation, unfolding equipment at the place of action, measures of safety with equipment used and other questions related to direct adaptation of means for localization and deletion of spills. In connection with this, it is not rational to include the use of ships, floating facilities and oil recovery equipment bearers in the context of training courses. Different types of boom fences and oil collecting devices can be unfolded from the pool wall. To create conditions similar to the situation on the ship/boat, the pool may be equipped with boom keeping and unfolding devices similar to boom-carrying ships.

In this way, ships or floating facilities which carry boom fences or oil collecting devices will not be included in the SPORT centre's equipment.

### 4.5.4 Storages (dispersants, sorbents and other clean-up materials)

The centre should have storage facilities for a large amount of oil recovery devices, as well as different auxiliary facilities for response operations, personnel, materials and cleaning facilities.

It is essential to take into account that the storage facilities should be large enough for the equipment, facilities for the individual protection equipment of the personnel, for temporary storage of collected water-oil mixtures, and equipment and facilities for cleaning oiled materials and technology. As for the storage requirements, it is essential to have separate locations for placing sorbents and dispersants, as well as locations for individual protection of the personnel.

Additionally there must be room in the storage facilities for repair and service facilities and equipment. In this case there should be room for repairing and workshops with essential equipment. Workshops should contain lathes, drillers, milling machines and mechanical and welding facilities.

## *4.6 Equipment required to fulfil the planned activities*

### 4.6.1 Mechanical recovery equipment

The centre should have at its disposal the main recovery equipment, which are being used in the Russian Federation. A draft list of needed mechanical equipment is as follows:

Different types of stationary skimmers like
- weir skimmers,
- disk skimmers,
- drum skimmers,
- belt skimmers,
- brush skimmers,
- suction skimmers and
- rope mop skimmers.

There are also several other skimmer types, but the final list depends on which kind of skimmers are used in North-West Russia.
- Advanced independent skimmers (skimmers with propulsion system)
- Skimmers connected to vessels:
    - side collectors
    - bow collectors
    - inbuilt systems
- Skimmers for icy conditions:
    - advanced independent skimmers (skimmers with propulsion system)
    - skimmers connected to vessels

*Figure 23. Weir skimmer, Foilex*


*Figure 24. Large disk skimmer, Komara*

*Figure 25. Bucket skimmer, which can be used also in icy conditions and for shoreline cleaning, Lamor.*

*Figure 26. Side collector, Lamor.*

### 4.6.2 Booms and booming

Booms can be categorised by design types or according the circumstances for which they have been designed. The list according to design types is as follows:

- fence booms
- curtain booms
    - with foam floating chambers
    - air flotation booms
        - self-inflatable booms
        - compressor inflated booms

Booms can also be divided into different groups by their capacity to collect oil in different wave and wind conditions:
- shoreline booms
- coastal booms
- offshore booms


*Figure 27. Off-shore rubber boom, Ro-Clean Desmi*

There are also special booms like
- fire resistant booms
- tidal booms for river use
- absorbent booms

Special fittings and accessories are needed, when applying and handling booms. Such are and should be available in the training centre:
- boom anchors, ropes and chains
- boom connectors
- boom reels
- power packs
- blowers for inflatable booms

### 4.6.3 Response boats and vessels

The training centre must have suitable vessels and boats at its disposal for practicing the use of booms and skimmers on water. The vessel must be equipped with a crane, it must have a possibility to deliver hydraulic and electric power and it should be large enough to carry at least one reel of offshore boom on deck. The vessel should be able to operate also in low speed, up to 1.5 knots and it must tow skimmers and booms safely.


*Figure 28. Built-in sweeping arm recovery system, Finnish Frontier Guard vessel Tursas, equipment, Lamor.*

### 4.6.4 Pumping devices

The training centre must have the main pump types used by different Russian authorities at its disposal. These could be:

- archimedes screw pumps
- lobe pumps
- peristaltic (hose) pumps
- vacuum pumps
- vane pumps for clean oils

*Figure 29. Archimedes screw pump, Ro-Clean Desmi*

### 4.6.5 Other needed material, machinery and equipment

Other needed material, machinery and equipment for the centre are:

- diesel-driven hydraulic and electric power packs
- steam generators
- dispersant spraying devices
- sorbents

- oil/water separators
- temporary storage basins, barrels, etc. for recovered oil
- towable oil tanks
- beach cleaning equipment etc.

### 4.6.6 Personal protection equipment

Equipment needed for personal protection of trainees:
- gas sensors
- protective clothing
- gas masks

## *4.7 Personnel of the SPORT centre*

### 4.7.1 Needed personnel and their qualification

For organizing and carrying out courses of practical training for oil spill combating specialists, the centre should have staff vacancies filled. The main personnel functions are as follows.

Administrative personnel (3 persons):
- to organize training, group formation, schedule preparation, etc.
- to take care of documentation, accounting and bookkeeping
- to issue training certificates, accounting and controlling of training certificates.

Training staff (3-4 persons):
- methodical courses providing, curriculum composition and alteration,
- carrying out studies with lessons, practical exercises, and hands-on training,
- carrying out the centre's research work

Technical staff (3 persons):
- preparing equipment and materials for use during the courses
- technical service and repairing the centre's equipment
- keeping and servicing the centre's fundamental resources

**Administrative personnel (3 persons):**

It is practical to divide administrative functions among three specialists; each of them will be responsible for execution of one function. Such responsibility division is most expedient, as different functions require different personnel specialization and qualification.

The organisation of training is entrusted to a training manager. This specialist is responsible for searching for new and working with the acting clients, organizing training, making course schedules, gathering training groups, appointing training instructors and accounting training. Qualification requirements for this specialist are: experience in administrative work in educational institutions, in running negotiations, experience in preparing training programmes, knowledge in oil spill combating.

Another specialist in this area should run accounting and bookkeeping. This specialist should prepare contracts for all the clients of the courses, companies and private per-

sons. Moreover this specialist should control the payments for the courses, and other payments of the centre, which are connected with his daily activities. Other tasks are calculating and controlling the centre's payments and purchases, settlement with contractors and subcontractors, calculating the salaries of the centre's teachers and personnel. The main qualification requirements for this specialist are: experience in running accounting and bookkeeping in educational institutions, taxation systems, and preparing and directing treaty documents.

Individual tasks are given to the specialist who is responsible for preparing and controlling the process of issuing certificates after training courses. This specialist is responsible for a whole complex of activities from forming groups of learners from the initial group lists to preparing certificates and learners' course evaluations. This specialist will be responsible for running paper and electronic archive of all courses, which the centre arranges. The main qualification requirements for this specialist are: knowledge in computer making-up, ability to work with designing software and text editors software, and experience in running databases.

Taking into account the initial work capacity, administrative functions can be executed by personnel working in full-time and part-time positions. Using variant with part-time activities is going to be efficient for the centre. For example, these functions can be delegated by agreement to the specialists of Markov Academy or another enterprise where the centre would be situated and whose specialists have great experience in such work.

**Training staff (3-4 persons):**

The responsibility for personnel training functions should be given to the instructors. Instructors will be responsible for preparing exercise books for course participants, shaping methods of running lectures and practical exercises, preparing tests, marking the knowledge and skills of the participants, controlling accident prevention observance during exercises and working with equipment. Instructors should have practical experience in oil spill combating, experience in teaching, and at least average technical basic education.

It is supposed that the researches will be an important part of the centre's activities. A general subject of researches must be connected to oil spill combating in different conditions. This work can be done by the centre's instructors or by outside part-time specialists. Therefore experience in research work can become an additional requirement for instructor's qualification.

At the initial stage of centre's operations 3 instructors are needed. Considering the intention to grow the centre's activities and the increasing needs in research work, the number of instructors can be increased by members of staff, or by part-time working specialists.

**Technical staff (3 persons):**

Technical functions guarantee the centre's daily activities and it's preparedness to carry out training according to the training schedule. Preparing equipment and materials for courses includes the gathering of the essential equipment according to the training programme and the list of practical exercises on water and testing in coastal areas. Selecting equipment at the depot and controlling its functioning must be done before the train-

ing begins by technical specialists in cooperation with the course instructors. The centre purchases equipment and changes in time the devices which became useless on request of the technical support. Moreover, the technical specialists independently or if needed in cooperation with subcontractors carry out scheduled service and maintenance of the centre's equipment for oil spill combating. Technical specialists also have to clean and maintain the pool (test tank), inner yard, storage facilities, maintenance of the workshop, training classes, and auxiliary buildings and offices.

Qualification requirements for these specialists are: Experience in exploitation of oil spill combating equipment, certificate and experience in operating storehouse's loaders, qualification and experience in using the pool's systems, qualification and experience in engineering systems and warehouses exploitation. Taking into account that the centre and the equipment should be constantly maintained in working conditions, technical personnel must be included in the staff.

Total amount of employee's of SPORT centre is about 10 persons, see Table 1.

*Table 1. Personnel for the SPORT centre*

| No. | Function | Position | Quantity | Full/Part time | Orientation |
|---|---|---|---|---|---|
| - | Administrative | Head of SPORT centre | 1 | Full | Centre |
| - | Administrative | Economist-Accountant | 1 | Full | Centre |
| - | Administrative | Specialist in training process organization | 1 | Full/partial* | Centre |
| - | Training | Instructor – Trainer | 3-4 | Full/partial* | Centre |
| - | Technical | Engineer - Master of oil combating operations | 2 | Full | Centre |
| - | Technical | Engineer – Driver | 1 | Full | Centre |

- Full or part-time employment for SPORT centre personnel is determined by the centre's capacity and the intensity of training realization.
- For administrative personnel part-time employment is the most convenient way for the centre's work organization.

# 5. LECTURES AND TRAINING MODULES

## *5.1 Oil Recovery*

Training of the personnel in oil spill combating is carried out with different types of equipment for different types of combating activities. For this purpose there is a need to use the following types of oil skimming equipment:

- wier skimmer
- oleophilic (ro-disc) skimmers
- disk skimmers
- brush skimmers
- stream strippers
- belt skimmers

Besides this it is necessary to use different kinds of boom fences:

- permanently floating booms (different heights)
- inflatable booms
- self-inflatable booms
- sorbing booms

Basic quantity of the needed equipment for the centre is one unit of each type of skimmer and one section (25 metres) of each type of boom fence. The exact types of all skimmers and booms needed for training activities are presented in 4.6.

One of the key issues for specialists in training should be the assessment of the actual output of each type of skimmer in different ways of working processes, and estimation of actual keeping abilities of the systems for oil spill containment.

The methodology of the training courses and the use of equipment should be chosen for different conditions of oil and oil product spills. The main interest should be in the training courses with weathered oil products, as main resource for oil combating operations.

Quantity of equipment which could be used simultaneously is determined according to the pool (test tank) size and the number of trained groups. The most probable way is to use one set of equipment for one group of trainees. It will give them an experience of concentrating on the work with one type of equipment, its peculiarities and efficiency of use in different conditions. In general, it will make the training more productive and useful for the participants.

## *5.2 Pumping*

Equipment for oil and oil product pumping must be available in different variations on water and on the coastal zone. Additionally, it is important to supply pumping systems for devices for working with tough oil products and in wintertime.

When arranging training courses with swapping systems it is necessary to pay special attention to safety management of the personnel and equipment, especially during activities in wintertime.

Trainees must be taught to the preparation work of the system, correct starting and control for functioning in the process of exploitation, technical service and cleaning after use. Besides this it is necessary to predict the possibility for use of swapping systems together with systems of hot water supply and heating of oil products.

During work in the warm period it is efficient to use swapping systems together with separators for the purpose of demonstration and teaching an efficient use of the complex of equipment, because it could work in different actual conditions of carrying out operations for oil spill combating.

## *5.3 In situ burning*

Carrying out the practical training for use of in situ burning methods on the oil spill location demands special safety measures for the personnel and technical equipment. In this case the work process should be carried out without removing weathered oil, which is connected to the risk of flaming and explosion of oil fumes. The training place should also be adapted for flaming operations without a danger of burning constructions, buildings and equipment of the centre.

Training courses should be carried out with oil burning on open air territory or on water. It is necessary to have special trays, devices for oil burning, oil skimmers for collecting tough oil and unburned wastes, flame-resistant boom fences, technology for smoke-catching and picking up burning oil products.

The special trays for oil burning on water should be large enough for possible use of flame-resistant boom fences. It could be used for modelling conditions for prevention of oil products flowing on the chosen area.

## *5.4 Beach cleaning*

The practical training for beach cleaning should be carried out with modelling of different conditions in different types of coastal zones. For modelling of conditions of the Gulf of Finland in the pool (test tank) there should be three types of coastal areas – sandy coast, sandy-stone, and stone coastal areas. Main instruments for the practical training must be handy mechanical oil skimmers, boom fences for the coast protection, sorbenting booms, tanks for temporary storage of oil-water emulsions and oiled sludge, ground storages, and facilities for individual safety of the operational personnel. The training could be carried out partly in the pool and partly on the coast of the polygon.

As additional equipment there could be high pressure pumps for washing oil products from stone surfaces and berth walls.

The planned test tank can be used for various purposes. Typical tests conducted for oil recovery purposes are oil spill containment boom performance studies and testing different

oil skimmers and mechanical recovery devices both in still water and in wave conditions. Various absorbing materials, agents and other chemicals to be used in oil spills can also be tested in the large basin, although the smaller laboratory devices often offer necessary and economically feasible means for testing purposes: smaller shaker bottles can be used for dispersant testing and studies for oil-water emulsions. By assembling a small flow flume system on a vertically moving table one can simulate tidal impact in coastline conditions, thus studies related to the oil-shoreline interactions can be adjusted in laboratory scale. Here is a brief introduction to the typical performance testing for booms and skimming devices.

**Booms** (static and booms under towage)

If the test tank is equipped with a towing facility of flow system the flow impact against the booms can be simulated in realistic conditions. Moreover the proposed wave generator will show the practicable limits for the boom performance. However, it is quite likely that the dimensions and the planned capacity of the flow generator and the wave machine do not allow the formation of the limiting wave or flow field for large booms.

However, by using the flow system/towing carriage and wave generator the following basic parameters can be determined giving an idea of the boom performance:
- first loss tow speed, is the lowest speed at which oil droplets will shed the boom
- gross loss tow speed is the tow speed at which a massive amount of oil is lost under the boom
- oil loss rate is the volume of oil lost during a given time
- critical tow speed is the moment when the boom looses its mechanical durability or fails
- tow force can be measured using force transducer or balance mounted to the rope or the support system

Typical measurements for booms in waves are the boom movement measurements and accelerations in waves. Appendix 7 shows a typical test memorandum of a boom test conducted in the OHMSETT test facility.

**Oil skimmers**

Typical skimmer tests are designed for recovery efficiency measurements. There are several parameters defining the efficiency at various current speeds, waves and with various oil types. The standard procedure for testing is to feed the skimmer with a known amount of oil and measure the amount of oil recovered. Typical parameters to be measured are the volume of oil, the amount of water recovered, the oil recovery rate, the characteristics of the recovered oil (water, emulsion etc.) and the entrainment of oil past and/or underneath the skimmer. The skimmer tests can be conducted in static conditions or in towing situations. Movement can be carried out by the towing carriage or using flow generation system.

Most commonly used efficiency parameters defined by testing are:
- throughput efficiency is the ratio of the amount of recovered oil versus the amount of encountered oil
- oil recovery efficiency is the ratio of the amount of recovered pure oil versus the total amount of recovered oil and water
- oil recovery rate is the volume of oil recovered per unit time.

Temporary storage devices such as floating type of sacks or pontoon can also be tested and used in the testing facility. The small water area beneath the planned oil recovery training centre also enables some of the performance testing of larger diameter units without oil (i.e. capacity tests, towing tests, buoyancy tests, floating tests etc.).

## *5.13 Clean-up procedures*

Cleaning up procedures of equipment and instruments used for operational processes for oil combating is an important element of the training courses of the personnel. For carrying out such work in the centre there should be a special place for spreading of polluted equipment, use of different kinds of cleaning, collecting and utilization of the gray waters and materials. Special technologies and hand-operated devices could be used in the cleaning up procedures of equipment.

For this purpose the territory of the centre should have a special area with necessary tanks for oil-contaminated waters and detergents, as well as special tanks for contaminated materials for following utilization. This special area should be provided with hot water either from the central water-heating system or a portable system of water-heating. Chemical detergents used for cleaning up procedures should be kept in the storage rooms of the centre.

Special attention must be paid to the preparation of the equipment for storing and transporting.

Technical service of the oil combating equipment should be organized in closed repair rooms. If technical service and repair work of the equipment will be carried out in wintertime there should be a heating system in the building. The size of the repair room should be large enough to fit one section of booms or a skimmer of the biggest size. Besides that special shelves and stands for instruments and depot units should be planned and constructed in the repair room. There should also be a separate place for welding works and a workshop for working with metals.

Training courses on technical service and repair work of the equipment should give trainees the opportunity to learn rules, methods and techniques of carrying out operations in accordance with technical documentation for oil combating operations.

One of the most important issues in the process of training should be learning of the safety code for technical service and repair works of oil combating equipment.

## *5.14 Waste handling*

Previous accidents have shown that the oil spills impacting the shoreline can produce from ten to thirty times more waste than the actual volume of spilt oil (IPECA 2004 and ITOPF 2007). In Finland, the collected amount is estimated to rise a hundredfold compared to the quantity of spilt oil. Collected waste material can be a mix of a wide range of substances including sand, beach debris, protective equipment and oiled animals.

As a preparation measure for confronting similar scale incidents, it is necessary to chart suitable areas for temporary oil waste storing places and make construction specifications for intermediate storages. Also the final treatment methods and capacities of local waste disposal companies need to be examined in order to dispose huge volumes of collected waste material in an environmentally acceptable manner.

These various components must be trained also together with the overall management of the cleaning itself. The training components can include:
- handling of oily wastes
- temporary storage
- final treatment and disposal
- oily waste transportation

# 6 CONCLUSIONS

The main goal of this work was to prepare a feasibility study as a part of the EU Tacis funded SPORT project. The main aim of the project SPORT is to produce feasible plans and drawings to be used as background material for architectural and constructional drawings of the proposed oil recovery training centre and to define the activities and training modules arranged by the centre.

The first part of this study contains background information of other oil recovery centres or similar facilities in the world. The emphasis has been laid on the most known facilities and bodies offering either training or testing services for oil recovery personnel and other relevant bodies.

Thus rather detailed descriptions of oil recovery and testing facilities in USA, UK, Norway, France, Sweden and Finland has been presented in this feasibility report.

Lessons learned from these analyses showed that the Norwegian model is well working, but far too complex and expensive. If the Norwegian model is adapted to Russia, it needs changes in the Russian legislation. However, there are many advantages in the Norwegian concept such as well-organized, harmonized training for the national level, VTS and pilotage are located in the same building, thus enhancing the cooperation and coordination between officials, tests can be performed with oil in the test tank and a good network with national R&D bodies.

French Cedre was observed to concentrate mainly on research and development and there are already many excellent institutions in Russia for that kind of activity. Cedre can however provide valuable information also to Russian authorities.

REMPEC is mainly a coordinating and information centre, which for the networking purpose may have a certain cooperative role with the St. Petersburg oil recovery training centre. One mode of cooperation is the international exchange of experts, seminars and joint library or database on the lessons learned worldwide. Here the future goal can be directed to the lessons learned within the oil recovery actions and shoreline cleaning in various environmental conditions, thus developing proven technologies or harmonized methodologies in a more global scale. The Finnish project SÖKÖ is a good example here of a harmonized procedure to develop a workbook or methodology suitable for local conditions.

Different environmental conditions, differences between accidental and illegal oil spills may require systematic procedures to be developed for sub-regional use, thus giving advice and good practice suitable for the conditions in question.

Generally it can bee seen that in order to achieve the goals which the training centre is planned to achieve, there must be possibilities to practice in near real circumstances. So there is need for a test basin with a wave generator for testing and practicing the use of skimmers and booms, enough open space for spreading out booms and testing power packs and preferably also a possibility to have a shoreline outside the centre for practicing with response equipment also at sea. All these in addition to classrooms equipped with modern IT and AV devices and functions. It depends then on the Russian legislation, if the centre needs to be IMO accredited to provide IMO training courses.

When analysing the need of training, i.e. the potential experts to be trained in the centre more than 800 companies were defined which, based on the Russian legislation, need to have trained personnel at their service. The general turnover of the SPORT centre could be about 500 persons per year (e.g. 300 persons by Makarov Academy courses and 200 for commercial training) at the first stage. It corresponds to the average number of trainees on the courses for specialists in Makarov Academy Training Simulators centre. The turnover of the SPORT centre could in fact be different and it depends on the efficiency of the control system for oil response operations in enterprises and legislation requirements for providing the preparedness level.

The oil combating personnel training can be seen taking place on three basic levels: basic (primary) training, upgrading training and hands-on training.

Training of the personnel should be organized in groups. Number of trainees in the group is determined by technical requirements of the pool (test tank), storage room facilities and equipment used and instructors working in the centre. The maximum group size within this study was defined to be 30 persons. However, depending on the course and activity smaller groups i.e. 8-10 persons are relevant. The lectures and simulations take place in the classrooms and they may hold larger groups of 20-30 persons maximum.

For organising and carrying out courses of practical training for oil spill combating specialists, the centre should have staff vacancies filled. The main personnel functions are as follows.

Administrative personnel (3 persons):
- to organize training, group formation, schedule preparation, etc.
- to take care of documentation, accounting and bookkeeping
- to issue training certificates, accounting and controlling of training certificates

Training staff (3-4 persons):
- providing methodical courses, curriculum composition and alteration
- carrying out studies with participants, practical exercises, and hands-on training
- carrying out the centre’s research work

Technical staff (3 persons):
- preparing the equipment and materials for use during the courses
- technical service and repairing of the centre's equipment
- keeping and servicing the centre's fundamental resources

Administrative personnel (3 persons):

For the design work the St. Petersburg City Administration defined a land area in Krasnoselsky district. The area under consideration is located nearby the Vodokanal's water treatment unit having an access to the Gulf of Finland. Thus the area is suitable for terminal and dock design, and has a proposed highway access. The proposed Main Building and supporting depots and other facilities will be located in this area.

The main facilities of the training centre are divided into indoor and outdoor facilities. The main facilities are the main interior hall, the training classroom for 20 persons, the laboratory room(s), the test tank hall, subsidiary rooms, technical service rooms and outdoor facilities with depots and relevant supporting facilities. The technical specifications of these facilities are shown in the appendix of this Feasibility Report.

The most essential part of the training centre besides the main office and lecture rooms is the test basin for oil boom and recovery device testing and training. It should have dimensions large enough for realistic training and testing. The tank is proposed to have a wave making device and an absorbing beach which can also be used for shoreline studies if covered by gravel or sand, or other material and/or vegetation.

Additional important facilities for the centre are the flow flume for specific oil-water interactive studies, a tidal flow/shoreline simulation system (optional) and a laboratory room for certain analytical work. The main principals for the facilities are as follows:

Main test tank:
- pool size between 10 x 20 m2 and 20 x 40 m
- water depth 1,5–2,0 m
- wall height over 50 cm above the still water level
- wave maker device attached to the end of the tank
- hinged or plunging (wedge form) wave maker recommended
- wave dampening beach which can be used both for wave absorbing and man-made sand/gravel shoreline studies with waves and oil
- enough lifting capacity for lifting up and down facilities for testing/training in the pool
- water circulation system (optional) by ejector principle (pump system)
- water-oil separation facility
- electric, pneumatic and hydraulics supplies (actuators, working machines, pumps etc.)
- cleaning facilities
- water inlets and outlets
- ventilation
- automatic alarm system for controlling the hydrocarbon content in the air and explosion protected electric facilities and lights
- standard measuring system and control room

Flow flume:
- 6–10 long flume with partial glass walls
- straight form or round facility
- typical height 0,5–1,0 m
- typical width 0,5–1,0 m
- typical range of water velocities 0–1,0 m/s

Tidal bed table
- for tidal studies
- hydraulic or electric motor-driven actuators
- a system for simulating vertical movements in shoreline conditions
- water supply system with automatic adjustment for tidal cycle simulations
- special glass or stainless steel basins for testing
- water intake/outlet system with pumping devices
- monitoring and sample taking systems.

An essential part of the training centre is the outdoor facilities with the depot for oil recovery and boom equipment. This material is essential for training, but has also value as a depot in real oil spill situations. A working area for assembly, service and repairing of the facilities is required at the depot. This facility should also have facilities for equipment cleaning after use with oil, oil-water separation chambers and relevant ventilation systems with explosion protected lights and power supply systems.

# 7 REFERENCES


CEDRE, www.cedre.fr

Halonen, Justiina. 2007. Toimintamalli suuren öljyntorjuntaoperaation koordinointiin rannikon öljyntorjunnasta vastaaville viranomaisille. Model of preparedness and coordination for oil combating authority in coastal areas (in Finnish). Publication (Serie A) of the Kymenlaakso University of Applied Sciences. 155 p + appendices.

Halonen, Justiina & Pascale, Melinda. 2008. SOKO Project: Developing Detailed Oil Combating Plan for Managing On-Shore Clean-Up Procedures in Finland. IOSC 2008 Proceedings.

Horten facility and background info: www.kystverket.no

Longo et al. IIHR Towing tank wave maker. Technical Paper. University of Iowa. USA: 21 p. http://www.iihr.uiowa.edu/

OHMSETT, www.ohmsett.com

OHMSETT 1999. Summary of activities at the Minerals Management Service Ohmsett Facility 1992-1997. 115 p.

OHMSETT, Prochure: Ohmsett Oil Spill Training, 3 p. www.ohmsett.com

OSRL, www.oilspillresponse.com

REMPEC, www.rempec.org

Tolonen Ilpo, 2008. Management of on-shore oil combating – a successful pilot project expanding along the coast of the Gulf of Finland. Merikotka Seminar, Kotka, Finland. July 25. 2008. 28 slides (www.merikotka.fi).

Wallingford. Flume wavemakers for physical models. Prochure. 4 p. http://hrwallingford.co.uk/Equipment/EQ012_wavemaker_flume.pdf

# APPENDICES

**Appendix 1: Mission Report – Study Visit to Horten, Norway. June 02-04. 2008-11-26**

**Appendix 2: OHMSETT week training programme**

**Appendix 3: SÖKÖ Work Packages**

**Appendix 4: Legislation documents for specialists for oil response operations and training**

**Appendix 5: Technical Performance Specifications, stage 1**

**Appendix 6: Technical Performance Specifications, stage 2**

**Appendix 7: Typical short test report of the OHMSETT test basin.**

**Appendix 1**

SPORT project (Tacis) Contract 2007/141-196

# Mission Report
# Study visit to Horten, Norway
# 2 - 4.6.2008

Consortium:
St. Petersburg Committee for Nature use, Environmental protection and Ecological safety,
Admiral Makarov State Maritime Academy,
Kymenlaakso University of Applied Sciences,
Finnish Environment Institute – SYKE,
Kotka Maritime Research Centre.

## 1. Introduction

June 2 – 6 2008 a study tour to Norway was arranged in connection for the South-East Finland – Russia New Neighbourhood Programme (Tacis) financed project: SPORT – St. Petersburg Oil Recovery Training Centre.

Four Russian experts and three Finnish members of the project personnel participated in the tour. The mission was part of the SPORT project action plan and a basis for the feasibility study of an oil spill training centre in St. Petersburg.

## 2. Purpose of Mission

The purpose of the mission was to get to know the Norwegian governmental oil spill response organisation, structure and duties of the oil spill centre of the Norwegian Coastal Administration in Horten and the technical solutions regarding the oil spill response centre, especially regarding the equipment and test basin. The oil spill response centre in Horten is the only one of its kind in the Scandinavian countries and within Baltic Sea region.

The Norwegian Centre for Marine Environment and Safety is a part of Norwegian Coastal Administration under the Norwegian Ministry for Fisheries and Coastal Affairs. The department for Emergency Response of the centre in the city of Horten consists of following parts and facilities:

- Administrative section
- Operations centre
- Training centre for oil spill preparedness
- Test centre
- Equipment depot and workshop
- Reference centre for Norwegian products and services.
- Vessel Traffic Service

The study visit in the centre included presentations made by Norwegian experts and the tour in the different facilities, operation rooms, depot, workshop, test basin and VTS-centre. The presentations made by the Norwegian hosts are attached to the report.

## 3. Key Issues Arising

During the visit and tour following issues were highlighted and discussed:

- Generally everything seems to work well and the legislation seems to cover all essential matters
- The organization of the staff in different depots, centres along Norwegian coast were well planned and economical.
- The Norwegian training system is well arranged and efficient
- The discussions and analysis about the Norwegian training system gave the participants useful knowledge for the planning of the planned centre in St Petersburg
- The classrooms for training were situated in the office building of the Norwegian Coastal Administration. In the St. Petersburg Centre a place for possible classrooms should be taken into account.

- The depot and the test basin were in separate adjacent buildings, which is necessary in order to keep the depot clean from oil.
- The equipment was well placed in the depot, one functional unit in one place. This allows for equipment to be quickly taken out of the depot when an actual situation happens.
- The depot was by the shoreline, which is efficient for moving and taking equipment into operation at the time of an accident.
- The Horten centre does not include laboratories. The analysis of samples from tests in the basin is done at the SINTEF laboratory.
- The Norwegian concept can be implemented in Russia, but has to be modified to suit the needs for the centre in Russia

Discussions were conducted connected to the presentations the Norwegian hosts made and continued after the presentations.

The Norwegian system of oil spill response and division of responsibilities was presented and discussed. The responsibilities include governmental and municipal level and enterprises, who are potential polluters. There are 14 depots for oil combating equipment along the coast of Norway. The preparedness of enterprises and the equipment required is based on scenarios made by the enterprise itself. A governmental organisation is responsible for the controlling that the plans and scenarios are adequate.

The details on how training is conducted for organisations and private companies responsible for oil combating was discussed. The responsible persons are trained on a frequent basis (at least one per year) at the Norwegian Coastal Administration. Certificates of passed training are given to the persons.

The discussions gave a good overview on how the responsibilities and training is arranged in Norway.

## 5. Next Steps

The presentations and other materials will be analysed and used as a ground material for the feasibility study, which will be made for the St. Petersburg Oil Recovery Training Centre during the next three months.

## Persons met

| Organisation | Participants | Position |
|---|---|---|
| Norwegian Coastal Administration | Ottar Longva | Senior Adviser |
| Norwegian Coastal Administration | Kjetil Aasebø | Adviser |
| Norwegian Coastal Administration | Nils Petter Andersen | VTS Manager |

## List of participants

| Organisation | Participants | Position in the SPORT project |
|---|---|---|
| St. Petersburg Committee for Nature use, Environmental protection and Ecological safety | Igor Berezin | Project Manager |
| St. Petersburg Committee for Nature use, Environmental protection and Ecological safety | Ksenia Shelest | Russian Project Coordinator |
| St. Petersburg Committee for Nature use, Environmental protection and Ecological safety | Konstantin Smirnov | Project Secretary |
| Admiral Makarov State Maritime Academy | Alexey Orekhov | Training Expert |
| Finnish Environment Institute | Kari Lampela | Project Expert |
| Kymenlaakso University of Applied Sciences | Jorma Rytkönen | Project Expert |
| Kotka Maritime Research Centre | Terhi Lindholm | Coordinator (FI) |

## Photos from the visit

1. Participants of the tour outside Norwegian Coastal Administration building in Horten

2. Horten centre basin

3. Horten centre basin

4. Participants of tour beside the basin

5. Equipment at Horten centre depot

6. Container with oil combating equipment outside the Horten center

**Appendix 2**

# OHMSETT and The National Spill Control School
# Texas A&M University-Corpus Christi
# Oil Spill Management

Leonardo, NJ
Topics and Schedule

**Monday Morning**
Introduction and Orientation
Contingency Plans
NCP – Operational Phases for Oil Spill Response
National Incident Management System IS-700
National Pollution Fund Center (Video)

**Monday Afternoon**
OHMSETT Site Tour and Equipment Orientation
OHMSETT Site Specific Safety Considerations
NIMS Incident Command Systems IS-100
Incident Management Handbook 2006

**Tuesday Morning**
Presentation by Frank Csulak
NOAA Sandy Hook
Scientific Support Coordination
NRDA
Actual Spill overview

**Tuesday Afternoon**
How to Establish a Command Post (Video)
Assigning Roles and Responsibilities
Public Relations and the News Media
Containment Boom Selection and Use
Boom Failure
Booming and Recovery Strategies
Environmental Fates and Effects of Oil Spills
Oiled Wildlife Rescue and Rehabilitation

**Wednesday Morning (1/2 Class Rotation)**
*GROUP 1 - Classroom*
Oil Spill Responder Safety
Site Safety Plans
Preparedness for Response Exercise Program
Introduction to GIS
Global Positioning Systems
Oil Spill Internet Sites
*GROUP 2 – Tank Exercises: Calm*

**Wednesday Afternoon (1/2 Class Rotation)**
*GROUP 1 – Tank Exercises: Calm*
*GROUP 2 - Classroom*
Oil Spill Responder Safety
Site Safety Plans
Preparedness for Response Exercise Program
Introduction to GIS
Global Positioning Systems
Oil Spill Internet Sites

**Thursday Morning (1/2 Class Rotation)**
*GROUP 1 – Classroom*
Alternative Response Technologies
GIS Applications in Oil Spill Response
Spill Documentation
GIS/GPS Field Exercise
Shoreline Characterization
*GROUP 2 – Tank Exercises: Waves*

**Thursday Afternoon(1/2 Class Rotation)**
*GROUP 1 – Tank Exercises: Waves*
*GROUP 2 – Classroom*
Alternative Response Technologies
GIS Applications in Oil Spill Response
Spill Documentation
GIS/GPS Field Exercise
Shoreline Characterization

**Friday Morning**
Oiled Waste Management (Video)
Spill Management: Tabletop Exercise
Critique of Tabletop Exercise

## Appendix 3.

# Description of contents and the authors of the work packages in SOKO pilot project

| Work package and study/studies | Content | Author / Executing organization |
|---|---|---|
| WP 1. Marine Oil Spill Accidental Risk | Estimating the probability, scale and probable place of oil spill incident threatening the Kymenlaakso Region. Estimating the length of shoreline to be affected by spilt oil by mathematical model for oil spreading after a risk-assessment based oil spill. | H. Haapasaari, Finnish Environment Institute SYKE |
| WP 2. Oil combating organisation for shoreline clean-up | Determining the authorities and experts participating in management of response operation. Building up an organisation to control and command operations effectively. | I. Tolonen, Kymenlaakso Regional Rescue Service<br>T. Ulmanen, Kymenlaakso University of Applied Sciences, Seafaring and Logistics Department |
| WP 3. Human Resources | Arranging personnel administration with salary payment, health care and occupational safety issues. Determining the procedures in receiving work force. | I. Tolonen, Kymenlaakso Regional Rescue Service<br>T. Jokinen, WWF Finland |
| WP 4. Financing and bookkeeping | Determining possible foundation sources for response operation, producing proposal for bookkeeping arrangements to co-ordinate expenditure and maintain adequate records. Representing compensation procedures. | L. Hasu, Kymenlaakso University of Applied Sciences, Business |
| WP 5. Reconnaissance | Creating reconnaissance plan to collect information from the contaminated area. Creating data forms and internet based software for collecting, feeding and analysing reconnaissance data. | T. Korhonen, Finnish Defence Forces<br>I. Tolonen, Kymenlaakso Regional Rescue Service<br>Ohjelmistoakatemia of Kymenlaakso University of Applied Sciences |
| WP 6. Arranging cleaning operations | Organising clean-up procedures in cleaning lines. Charting equipments and estimating related costs. Producing operative charts. | A. Mikkola, National Land Survey of Finland<br>I. Tolonen, Kymenlaakso Regional Rescue Service<br>K. Lempinen, Kymenlaakso University of Applied Sciences, Logistics |
| WP 7. Loading and discharging oily wastes | Creating loading and discharging plans for most important islands and mainland harbours, charting loading equipment and related costs. | E. Hakala, Kymenlaakso University of Applied Sciences, Seafaring and Logistics Department |
| WP 8. Routes and equipment for transportation<br>8.1 Logistical points<br>8.2 Transportation by road<br>8.3 Transportation by sea | Charting transportation equipment and related cost. Creating databases for sea and road transportation equipment. Producing driving instructions with GPS-points for the oil waste collecting points. Creating an database for safe sea routes. Reviewing the transportation law and liability issues, and preparing forms for contracts of affreightment. | S. Välilä, Kouvola Vocational Adult Education Centre, Department of Transportation.<br>J. Kontuniemi, Kymenlaakso University of Applied Sciences, Seafaring and Logistics Department<br>A. Varis, Kymenlaakso University of Applied Sciences, Logistics<br>T. Venäläinen, Kymenlaakso University of Applied Sciences, Logistics |
| WP 9. Oil waste management<br>9.1 Temporal storing sites<br>9.2 Construction specifications<br>9.3 Final treatment | Determining waste streams and separation. Charting places for temporal storing sites from archipelago and mainland. Producing construction instructions for storing sites. Charting final treatment methods and disposal capacities in the region. | M. Tani, South-East Regional Environmental Centre<br>M. Peltomäki, Hämeenlinna University of Applied Sciences, Environmental technology<br>J. Mikkola, Hämeenlinna University of Applied Sciences, Environmental technology<br>M. Horttanainen, Lappeenranta University of Technology, Department of Energy and Environmental Technology |
| WP 10. Communication | Creating a communication plan for response management team. Determining arrangements in internal communication, information and media. | T. Puhakka, Kymenlaakso University of Applied Sciences, Media |

**Appendix 4**

**Legislation documents for specialists for oil response operation training.**

1. **Federal Law of Russian Federation №151-FZ on 22.08.1995. «About Emergency Rescue Services and status of Rescue staff»**

**«Article 12.**

- **Emergency Rescue Services and Emergency Rescue groups, which have not obtained the attestation/certification, are not eligible to take part in the response operations and recovery and liquidation works, and are not attracted to the emergency rescue operations.**

- **Activities of organizations, in case of not having the required personnel training, is stopped partly or totally according to the requirements of the legislation of RF»**

2. **Government of Russian Federation Decree №240 on 15.04.2002. «About the order of activities of organizations for oil and oil products spills preparedness and combating on the territory of Russian Federation»**

**«…Organizations are obliged:**

- **To train specialists in approaches of safety and actions in case of accidents related to oil and oil product spills.**

- **To allow only persons, who fulfil the qualification requirements to work with dangerous industrial objects.»**

- **Ministry of Transport of Russian Federation Decree №VR-28-r on 27.03.2002. "About the system creation for training, upgrading training and re-training of specialists for oil spill and other dangerous substance recovery"**

**«…to create special training centres for training, upgrading training and re-training of specialists for oil spill and other dangerous substance recovery at sea…»**

3. **Government of Russian Federation Decree № 613 on 21.08.2000 «About the emergency measures for preparedness and oil and oil product spill combating»**

4. **Qualification requirements and methodological recommendations for carrying out certification of Emergency Rescue Services, Emergency Rescue groups and rescue staff. (Approved by the Inter-authorities Commission for certification of ERS/ERG and authorities for their training, Protocol №4 on 18.12.1997 with changes by Protocol №2 on 09.06.2003.)**

5. **The course of ship/vessel crew training (KPSP-93) and departments of State Maritime Rescue Service of Russia and liquidation of consequences after maritime accidents.**
   **(Instruction letter State Maritime Rescue Service of Russia on 01.07.1996 N GMS-PS/215, license N 9 of EMERCOM of Russia on 27.10.1994)**

**Appendix 5**

# TECHNICAL PERFORMANCE SPECIFICATION

## for works on Architectural and Planning solutions for Oil Recovery Training Centre in St. Petersburg in the framework of the international EU-funded project “SPORT – St. Petersburg Oil Recovery Training Centre”

## Project stage I – Pre-planning Construction works

| № | Main data & requirements | Content |
|---|---|---|
| 1 | Legal basis for construction planning | 1. International project “SPORT – St. Petersburg Oil Recovery Training Centre” in the framework of the Neighborhood Programme South-East Finland – Russia (Grant Contract of EU Commission 2007/141-916)<br>2. Decree of Government of Russian Federation<br>«About urgent measures for oil and oil product spill prevention and combating» N 613 on 21.08.2000<br>3. Statement of Committee for Nature Use, Environmental Protection and Ecological Safety, approved by the Decree of St. Petersburg N 530 on 06.04.2004 |
| 2 | Structure of documentation works | Architectural and Planning solutions |
| 3 | Stages of the project | I - Pre-planning Construction works |
| 4 | Special conditions of projecting and construction | 4.1 Construction and building plans and drawings documentation is delivered to the Customer in 4 (four) copies in accordance with building norms and acts in force and by the contest in accordance with “Construction Norms and Rules” №11-01-95 point 4.2.<br>4.2 Used equipment and building materials should have Russian certificates.<br>4.3 Construction design works for the SPORT centre include an inner pool/test tank, with size of 20x10 m and depth of 2 m imitating the coastal zone. |

| | | |
|---|---|---|
| 5 | Main technical and economical performance indicators | The objective is the construction of the building for the SPORT centre with size of 65x20 m with an inner pool/test tank for training activities.<br>The administrative and service part of the building is (3) three-storeyed. |
| 6 | Destination and types of interior rooms, their capability, capacity, structure and composition of inside area, total construction volume. | Carrying capacity of the centre is 500 pers. per year.<br>Maximum simultaneous capacity of the centre is up to 30 pers. (for 2-3 groups of 10 persons each).<br>6.1 The building should include following interior rooms:<br>6.1.1 Main interior rooms:<br>- main entrance hall;<br>- training classroom for 20 persons;<br>- laboratory rooms (for mineral oil analysis)<br>- test tank/pool with size of 20x10 m and depth of 2 m imitating the coastal zone<br>To provide 3 types of coastal zones:<br>- sandy flat coast,<br>- stony coast,<br>- wharf/ berth wall |
| | | 6.1.2. Subsidiary rooms:<br>- director's office,<br>- administrative staff's office;<br>- instructors' room;<br>- technical and service staff's room;<br>- locker rooms for men (20 persons) and women (10 persons) with toilets, shower rooms and sauna,<br>- toilets for visitors according to sanitary norms and standards,<br>- inventory room (for storage of working clothes, inventory and materials);<br>- storage facilities for oil recovery equipment<br>- mineral oil depot (outside the building) |

| | | |
|---|---|---|
| | | 6.1.3. Technical service rooms:<br>- water measuring unit;<br>- heating unit;<br>- electrical control unit;<br>- air ventilating/climate control shaft according to standards;<br>- charging station of the electric loader;<br>- pump house of the test tank/pool with full scheme of water treatment (pump units, filter equipment, equipment for water treatment, heat exchange equipment, reagent equipment),<br>- local waste water treatment facilities for oil and suspended substances refinement. |
| 7 | Basic requirements for architectural design of the building, conditions of blocking and building design | 7.1 The architectural design of the building should ensure the technological scheme of the training process and simple use of the centre.<br>7.2 The exterior front design to be drawn up in accordance with modern architectural design solutions.<br>7.3 Fine walls covering should be done by using tiled materials for the purpose of easy access for sanitary cleaning.<br>Main entrance hall: suspension ceilings and floor of ceramic granite.<br>Shower rooms and toilets: walls and floors of ceramic granite and suspension ceilings.<br><br>Main hall of the inner test tank/pool:<br>ceiling is not hemmed (to lay profiled white plates on purlins, and then to lay roofing), passing paths of Dutch tile/dalle.<br>To provide lifting equipment.<br>Technology of the training system should provide:<br>- systems of wave formation and wave absorber;<br>- system of making water flow and system of making airflow over the water surface;<br>- local system of tank water treatment;<br>- use loaders as uploading/downloading equipment;<br>- use 1-2 oil skimmers and 1 section of booms;<br>- workability of different types (high gravity oil, heavy oil) for imitating oil spills. |

| | | |
|---|---|---|
| 8 | Basic design and materials of supporting construction and frame filling requirements | Foundation is to be calculated.<br>Cup of the test tank/pool of reinforced concrete.Building wire framed.<br>Building pillars of reinforced concrete, collapsible and solid.Inserted floor of solid reinforced concrete.Wall infilling of front – to use panels of elements construction.Roof soft by profile floor or metallic; storm-collector, gutters are equipped with electrical heating for guaranteeing unimpeded water drain and prevention of icicle formation. |
| 9 | Basic requirements for engineering and processing equipment | According to construction regulations and rules, technical solutions should be in accordance with the requirements of the factory producer and be confirmed by certifications (passport of quality) of the factory producer. |
| 10 | Requirements for the necessity of coordination of project | 10.1 Main technical solutions by all parts of the construction design project should be agreed and submitted to all interested services and instances together with the general designer.<br>10.2 Construction design project should be submitted to inspection organizations and State Inspection Authority in accordance with established procedure together with general designer. |
| 11 | Required reporting documents | Technical report<br>Statement of facts for works which have been done |

**Appendix 6**

# TECHNICAL PERFORMANCE SPECIFICATION

for works on Construction and building plans and drawings for Oil Recovery Training Centre in St. Petersburg in the framework of the international
EU-funded project “SPORT – St. Petersburg Oil Recovery Training Centre”

Project stage II – Planning Construction works

| № | Main data and requirements | Content |
|---|---|---|
| 1 | Legal basis for construction planning | 1. International project “SPORT – St. Petersburg Oil Recovery Training Centre” in the framework of the Neighborhood Programme South-East Finland – Russia (Grant Contract of EU Commission 2007/141-916)<br>2. Decree of Government of Russian Federation<br>«About urgent measures for oil and oil product spill prevention and combating» N 613 on 21.08.2000<br>3. Statement of Committee for Nature Use, Environmental |
| 2 | Structure of documentation works | Construction and building plans and drawings |
| 3 | Stages of the project | II - Planning Construction works |
| 4 | Special conditions of projecting and construction | 4.1 Construction and building plans and drawings documentation is delivered to the Customer in 4 (four) copies in accordance with building norms and acts in force and by the contest in accordance with “Construction Norms and Rules” №11-01-95 point 4.2<br>4.2 The equipment and building materials used should have Russian certificates.<br>4.3 Construction design works for the SPORT centre include an inner pool/test tank, with size of 20x10 m and depth of 2 m imitating the coastal zone. |

| | | |
|---|---|---|
| 5 | Main technical and economical performance indicators | The objective is the construction of the building for the SPORT centre with size of 65x20 m with an inner pool/test tank for training activities.<br>The administrative and service part of the building is (3) three-storeyed. |
| 6 | Destination and types of interior rooms, their capability, capacity, structure and composition of the indoor area, total construction volume. | Carrying capacity of the centre is 500 pers. per year.<br>Maximum simultaneous capacity of the centre is up to 30 pers. (for 2–3 groups of 10 persons each).<br>6.1 The building should include following interior rooms:<br>6.1.1 Main interior rooms:<br>- main entrance hall;<br>- training classroom for 20 persons;<br>- laboratory rooms (for mineral oil analysis)<br>- test tank/pool with size of 20x10 m and depth of 2 m imitating the coastal zone<br>To provide 3 types of coastal zones:<br>- sandy flat coast,<br>- stony coast,<br>- wharf/berth wall |
| | | 6.1.2. Subsidiary rooms:<br>- director's office;<br>- administrative staff's office;<br>- instructors' room;<br>- technical and service staff's room;<br>- locker rooms for men (20 persons) and women (10 persons) with toilets, shower rooms and sauna;<br>- toilets for visitors according to sanitary norms and standards;<br>- inventory room (for storage of working clothes, inventory and materials);<br>- storage facilities for oil recovery equipment;<br>- mineral oil depot (outside the building)<br><br>6.1.3. Technical service rooms:<br>- water measuring unit;<br>- heating unit ;<br>- electrical control unit;<br>- air ventilating/climate control shaft according to standards;<br>- charging station of electric loader;<br>- pump house of the test tank/pool with full scheme of water treatment (pump units, filter equipment, equipment for water treatment, heat exchange equipment, reagent equipment);<br>- local waste water treatment facilities for oil and suspended substances refinement. |

| | | |
|---|---|---|
| **7** | Basic requirements for architectural design of the building, conditions of blocking and building design | 7.1 Architectural design of the building should ensure the technological scheme of the training process and simple use of the centre.<br>7.2 Exterior front design is drawn up in accordance with modern architectural design solutions.<br>7.3 Fine walls covering should be done using tiled materials for the purpose of easy access for sanitary cleaning.<br>Main entrance hall: suspension ceilings and floor of ceramic granite.<br>Shower rooms and toilets: walls and floors of ceramic granite and suspension ceilings.<br><br>Main hall of the inner test tank/pool:<br>ceiling is not hemmed (to lay profiled white plates on purlins, and then to lay roofing), passing paths of Dutch tile/dalle.<br>To provide lifting equipment.<br>Technology of the training system should provide:<br>- systems of wave formation and wave absorber;<br>- system of water flow making and system of making airflow over the water surface;<br>- local system of tank water treatment;<br>- use loaders as uplifting/lowering equipment;<br>- use 1–2 oil skimmers and 1 section of booms;<br>- workability different types (high gravity oil, heavy oil) for imitating oil spills. |
| 8 | Basic design and materials of supporting construction and frame filling requirements | Foundation is to be calculated.<br>Cup of test tank/pool of reinforced concrete.Building: wire framed.<br>Building pillars of reinforced concrete, collapsible and solid.Inserted floor of solid reinforced concrete.Wall infilling of front: to use panels of elements construction.Roof is soft by profile floor or metallic; storm-collector, gutters are equipped with electrical heating for guaranteeing an unimpeded water drain and prevention of icicle formation. |

| | | |
|---|---|---|
| 9 | Basic requirements for engineering and processing equipment | According to construction regulations and rules, the equipment should be produced in accordance with requirements of the factory-producer and be confirmed by certifications (passport of quality) of the factory-producer.<br>9.1 Exterior lighting. To prepare a project by relevant specifications in the following composition:<br>- front facades lighting,<br>- to provide a feeder for exterior lighting.<br>9.2 Water supply and sewage system.<br>To include in the project:<br>- household water supply pipeline system;<br>- hot water supply pipeline system;<br>- internal system of sewage and rainwater disposal;<br>- local treatment facilities for test tank/pool's water treatment from oil products and suspended substances;<br>- watering taps on passing paths and in the service cleaner's office.<br><br>- (Two variants of water circulation in the tank)<br>Pump house of the tank with filters for primary filling and re-circulation, loop pipelines for filling, re-circulation and overflow;<br>- packaged incoming water quality control system, pH and C1, automatic batchers of chemicals and coagulants; Putting of flowmeters, indicating the amount of water supplied in the tank and the quantity of fresh water coming in the circulation of the tank;<br>- master cocks for sampling before and after filters;<br>- circle water carriage of passing paths;<br>- accumulating tank for overflowed water in the system of water circulation in the test tank;<br>- To use foreign plastic pipes, locking and regulating armature and sanitaryware devices, pumping outfit, filters and heat exchanger of national and foreign manufacture. To confirm use of the foreign equipment with the customer.<br>9.3 Heating and ventilation/climate control.<br>To provide:<br>- heating unit linking up with the city network system in accordance with specification. |

| | | |
|---|---|---|
| | | 9.4 Electrical equipment:<br>- to work out engineering system of the electric supply of power packs, general lighting, emergency lighting, on duty lighting and evacuation lighting; equipped with the lead-in distributor (of foreign manufacture) by contact breaker safety catches at entrance, automatic circuit breaker at divergent lines, energy counter;<br>- to provide lighting of the main hall in 3 modes: on duty lighting, general lighting, lighting at period of imitation of night conditions work;<br>- wiring harness is copper cable, under plaster or in electric raceway;<br>- to provide power supply of separate lighting group with use of magnetic starters for remote control,<br>- to provide lightning protection and bonding;<br>- to provide bundling of control panel and pane by produce of import manufacture.<br>9.5 Fire fighting and alarm system according to norms in force.<br>9.6 Intruder-fire alarm and fire automation are according to rules and norms in force.<br>9.7. Warning system and internal installation of wire-less/radio (according to valid norms).<br>9.8. Installation of telephones.<br>To provide mini Automatic Telephone Station.<br>9.9 Television system.<br>To draw up television system.<br>To place wall outlets in the classroom, hall and administra-tive rooms. |
| 10 | Requirements for the necessity of project coordination | 10.1 Main technical solutions by all parts of the construc-tion design project should be agreed and submitted to all interested services and instances together with the general designer.<br>10.2 Construction design project should be submitted to inspection organizations and State Inspection Authority in accordance to the established procedure together with general designer.<br>10.3 To take into account architectural and planning tasks. |
| 11 | Required reporting documents | Technical report<br>Statement of facts for works which have been done |

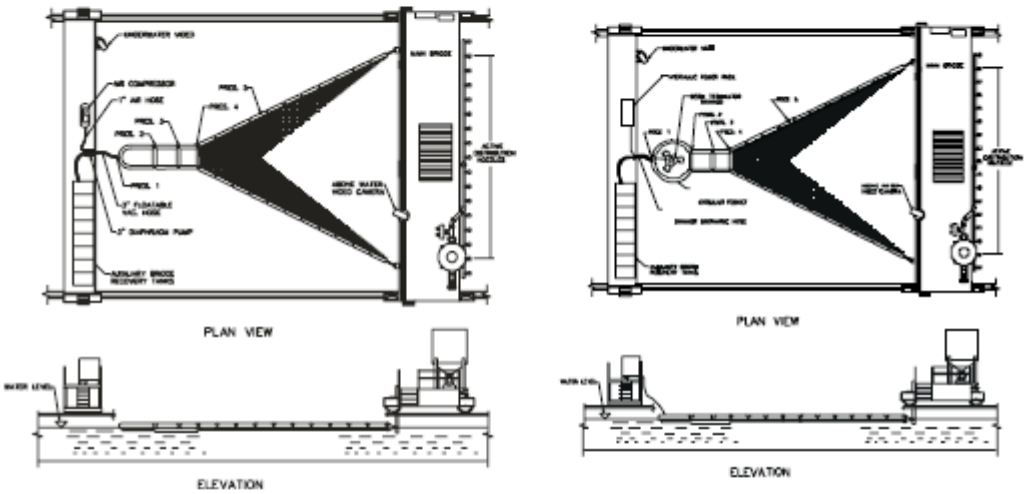
## Typical short test description of the OHMSETT test basin

**Summary of Activities** **Minerals Management Service Ohmsett Facility (1992-1997)**

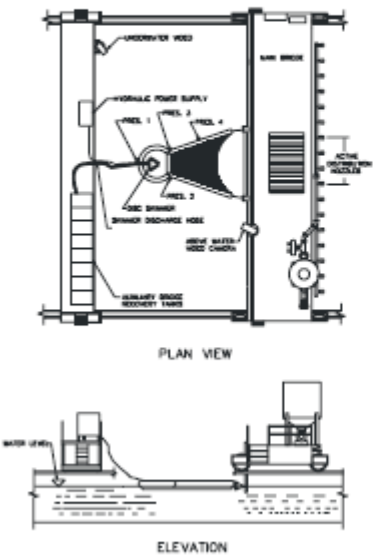
| |
|---|
| Test Title: **PACIFIC LINK MULTI BOOM TESTS** |
| Test Date: **June - November 1995** |
| MMS/OHMSETT Work Order #: **13** |

**Background and Objective:**

Historically, oil booms have not been able to recover oil efficiently at speeds exceeding 1.5 knots. At the time of this test, the Pacific Link Multi Boom System was identified as having the potential to recover oil efficiently at towing speeds greater than 2 knots. The designers of the Pacific Link System used their extensive hands-on experience with commercial fishing trawl nets to develop the Pacific Link Multi Boom System.




*Configuration 1* *Configuration 2*




*Configuration 3*

Figure 3.23 Pacific Link Multi Boom System (Three Configurations)

The system has three configurations as shown in **Figure 3.23**. The Pacific Link Multi Boom is towed through the water by the end of each extension arm as with conventional sweeping booms. In each configuration, an air-inflated V-shaped trawl funnel is positioned in front of the specially designed oil trap. The subsurface netting is attached to the skirt of the trawl; the net's purpose is to maintain the V-shape of the boom. Two trawl funnels were tested with the system, one with a 50-ft maximum funnel width, and one with a 15-ft maximum funnel width.

An oil trap, with air-inflated cross baffles, is positioned aft of the funnel net. The oil trap is designed to reduce the relative fluid velocity and wave action within the trap. The forward tube in the trap floats on the water surface; this tube is meant to reduce surface chop, slow the relative fluid velocity, and block debris from entering the trap. The middle tube is 40% submerged; this tube is meant to act as a submersion plane skimmer that forces oil and water under the tube and then allows oil to rise to the surface behind it while forcing water down and out of the

system. The last transverse tube is almost 100% submerged; this tube is meant to act like a weir skimmer allowing oil to flow over the top while forcing water down and out of the system.

The after section of the oil trap is referred to as the sump; this is where the oil is pumped out of the system and recovered. The system design was meant to provide a relatively (when compared to ambient conditions) low current and wave-free environment for oil recovery.

A circular pocket was used in configurations 2 and 3 (**Figure 3.23**) of the oil trap. The circular pocket allows insertion of a larger oil skimmer than the trap sump does in configuration 1. The circular pocket is also meant to create a "quiet" environment by a reduction in relative fluid velocity as the fluid flows from the small diameter funnel to the larger diameter pocket.

The objectives of these tests were to measure and record the oil collection performance and the seakeeping performance of the Pacific Link Multi Boom system, and to determine if this system can efficiently recover oil at towing speeds in excess of 2 knots.

**Description of Test Procedures:**

Each end of the boom was connected to the Ohmsett Main Bridge. The boom gap ratio was 2:1 (that is, the total boom length was twice as wide as the opening).

The Ohmsett Main and Auxiliary Bridges are mounted on rails and can be moved through the tank basin at varying speeds. The movement of the main bridge is remotely controlled from the Ohmsett Control Tower from which the entire tank basin can be seen. Video monitoring of the test (above and below water) and data collection from the various sensor suites are also done from the Control Tower.

Three wave conditions were used for testing:

1. Calm Water - no wave generated by paddle,
2. Significant wave height of 7 in. average period of 1.9 sec., and
3. Significant wave height of 9 in. average period of 2.8 sec.

These wave conditions reflect average values taken from the Final Report. Wave Condition 2 has a wavelength approximately twice the length of the trap, which in theory provides maximum excitation of the trap section.

The **Pre-load** testing and the **First Loss Tow Speed** testing were done simultaneously. The tow speed in which a boom first begins to lose oil is defined as the First Loss Tow Speed. The Pre-Load test determines how much oil will be placed into the apex of the boom before towing begins. There is a point when adding more oil into the boom pocket has a minimal effect on the speed at which the First Loss of oil occurs. This volume is defined as the Pre-Load volume. The proper Pre-Load volume is determined empirically by incrementally adding more oil to the boom pocket before towing, and then measuring the speed at which First Loss Tow Speed occurs. When the First Loss Tow Speed does not increase significantly with the addition of more oil, the Pre-Load volume and the First Loss Tow Speed are recorded.

The speed at which oil is continuously entrained underneath the boom is defined as the **Gross Loss Tow Speed**. The Gross Loss Tow Speed is determined by monitoring underwater video camera images from the Control Tower.

The **Oil Loss Rate** test is done by pre-loading the boom with oil and towing the boom at increasing speeds. During the Oil Loss Rate test, oil is added to the boom during tow in an attempt to create a semi-steady state condition where the amount of oil within the boom is constant throughout the test.

The **Critical Tow Speed** is defined as the speed at which the boom being towed loses its freeboard or its draft (planes or submerges). The boom is towed at increasing speeds until the "failure mode" is observed.

The **Towing Force** is defined as the tension force in each of the boom's towing lines during tow. The towing forces are continuously measured using load cells, and the data are recorded in the Control Room data collection computer.

The oil **Throughput Efficiency** is the ratio of the oil volume recovered to the oil volume encountered by the system.

The **Oil Recovery Efficiency** is the ratio of the volume of pure oil recovered to the total volume of oil/water mixture recovered.

The **Maximum Oil Recovery Rate** is the maximum value of oil volume recovered per unit time.

## Summary of Results:

### First Loss/Gross Loss:

None of the three configurations tested showed a significant increase in First Loss or Gross Loss speeds when compared to conventional boom systems. By design, the system operates above the First Loss Tow Speed because oil must entrain beneath the two cross baffles in order to reach the sump section for skimming. First Loss and Gross Loss Tow Speed were determined by observing oil lost outside of the system; thus, oil that successfully entrained into the sump area was not considered indicative of First Loss or Gross Loss.

### Throughput Efficiency (TE) and Recovery Efficiency (RE):

The primary objective of this test was to determine if any of the system configurations tested could efficiently recover oil at speeds in excess of two knots; the results showed that they could not. Throughput Efficiencies at the speeds tested were found to be 30% or less (30% or less of the oil encountered was recovered). A possible reason for the low efficiencies was that at high tow speeds, a significant amount of oil was lost before it reached the trap's sump.

The type of skimmer being used and the oil collection capabilities of the boom affected the Recovery Efficiency (percentage pure oil recovered). The lowest recovery efficiency was observed when oil was removed with a suction hose. The best overall performance was achieved with configuration # 3, which had a RE as high as 90%, and a TE as high as 54%; however, these values were obtained at speeds less than 0.75 knots.

## Summary of Findings:

In general, the performance characteristics of the three Pacific Link System configurations were similar to those of other conventional boom/skimmer oil recovery systems. The three configurations did not exhibit enhanced oil containment and recovery capabilities at speeds above 2 kts.

## Final Report Reference:

Nash, J., D. DeVitis, D. Backer, and S. Cunneff, 1997. PACIFIC LINK MULTI BOOM TESTS, Minerals Management Service Contract No. 14-35-0001-30544. Prepared by MAR, Incorporated, 6110 Executive Boulevard, Suite 410, Rockville, MD 20852, 40 pp. + app.