

Electronic Monitoring System (EMS) for sustainable management of sand and gravel resources

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Sand extraction on the Belgian part of the North Sea started in 1976. But it is only since 1996 (due to the Royal Decrees of 1996 and later: koninklijke besluiten betreffende de exploratie- en exploitatievoorwaarden verbonden aan de concessiebesluiten) Electronic Monitoring Systems (EMS) are used to record and control the sand and gravel extraction activities on the Belgian part of the North Sea. Over the years, slight adaptations were made in the legislation and agreements concerning EMS obligations resulting in full EMS data records (from extractions performed by the private sector) available since June 2002. In addition of OD Nature's responsibility to manage and process the EMS data (agreement with FPS Economy, Continental Shelf Service), data was also processed and reported (from various logging systems) from extractions with trailing suction hopper dredgers (TSHD) without EMS in the framework of the construction of submarine pipelines in 1997 (Interconnector and NorFra) and of coastal protection (beach nourishments) and other maritime works (Flemish Region, Coastal Division and Division Maritime Access) in 2004 and 2005. Afterwards, activities on the license of the Flemish Region are also monitored by the EMS.

The obligation to install an EMS on the TSHD that meets the technical specifications is regulated as a condition for the concession. The EMS automatically records among others the following parameters: identification of the vessel, the code of concessionary, the date, the time, the geographical position, the speed, the status of dredging pump(s) and the dredging activity. All necessary sensors are installed to enable the recordings of the parameters above-mentioned. On the one hand, this closed and sealed system (and its recorded and processed data) allows to verify whether other conditions of the concession are respected: permitted areas, minimum average speed during extraction and, if necessary, the to be respected distance between multiple extraction vessels. The processed data gives also an indication for the maximum volume that has been exploited. On the other hand, the recorded and processed EMS data is one of the tools for the continuous monitoring of sand and gravel activities. This in addition to the data derived from the registers and from the regular bathymetric, hydrodynamic and sediment transport surveys. The presence of an EMS on the dredging vessels is also controlled by the Aerial surveillance team of RBINS-OD Nature-MUMM (SURV), which reports on the observed dredging vessels and their extraction activities.

Since 2014, new EMS-systems are operational. The main reason for the renewal was the ability to follow up more frequently the proper operation of the recording device and the recorded data (via telemetry) (schematic view, see Figure 1). Another change is the entry by the crew of the parameter 'actually extracted volume' after every trip. During the pilot project a system that complies with the new specifications was placed parallel to a former EMS for detailed comparison and evaluation purposes. The final results of the pilot were presented to the Advisory Committee on June 25, 2013 followed by a circular of Continental Shelf Service to the concessionaires on August 22, 2013. Herewith, all concessionaires were informed of the revised technical specifications and guidelines for the EMS which they had to fulfill by the beginning of 2014. The new systems permit short-term data availability, which allows a better monitoring of the extraction activities as well as taking faster appropriate policy

measures (for example closure or opening of certain parts of the sand and gravel extraction zones) when needed.

The EMS data records (both from the old and new systems) also allow for an estimation of sand extraction intensity (extracted volume of trailing suction hopper dredger per timeframe by using the declared load (new EMS) or the known fixed loading capacity (old EMS)). This enables the final data table to be used to evaluate the extracted volume on any surface and for any timeframe as well as making grids of extracted volumes per year.

The new EMS truly fulfills the expectations, seen the following characteristics:

- low cost, easy to install and to maintain, reliable performance;
- data falsifications is almost impossible;
- the compatibility with the demands of the ICES WGEXT working group and OSPAR makes the correct reporting of the analyzed electronic monitoring data (geospatial data on extraction locations in the form of shape files) straightforward.

The only disadvantage of the current system is that extracted volumes (per timeframe) are estimations (as the EMS is not equipped with sensors to record the load) but practice shows this approach is more than satisfactory.

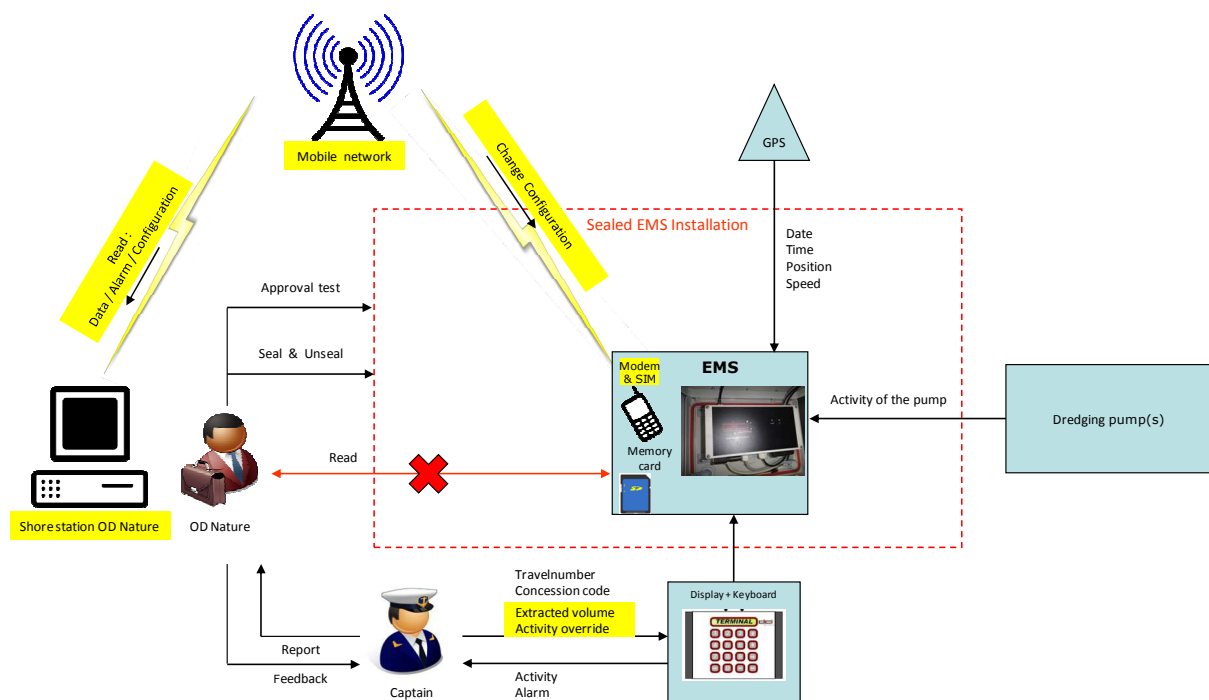


Figure 1: Schematic overview of the EMS as in use since early 2014 (EMS 2.0), the interaction with the system and the changes relative to EMS 1.0 are marked in yellow.