

### INVENTORY OF ASSESSMENT TOOLS (COMPUTER MODELS)

#### OIL

Contracting Party	Name of tool	Applicable area	Specific type of software	GIS related	Calculation parameter(s)	Time horizon	Input	Output	Availability
Belgium	MU-slick  Oil spill behaviour models: <a href="http://www.mum.m.ac.be">http://www.mum.m.ac.be</a>	Bonn Area	Fortran 77 Unix	No	Transport is calculated by vectorial addition of current and wind. Effects of gravity, surface tension, viscosity and inertia on a circular slick predict spreading. Weathering due to evaporation, dispersion, dissolution, aerosol formation and mechanical recovery.	One week in one-hour steps.	Spill location, date and time, type of oil. Current. Wind.	Maps, text, curves.	24 hours, request in office hours.
Denmark	SEA TRACK WEB <a href="http://www.cis.svn.dk/">http://www.cis.svn.dk/</a>	Danish waters and the Baltic Sea	Windows	Yes	Vector addition of contribution from water current and wind	1 to 40 hours	Date, time, position, oil type, volume, wind, current and temperature	Numerical tables and maps	24 hours
France	TRANSSPILL	The Channel	Special Programme	No	Vectorial addition of current and wind.	1 to 72 hours	Current, wind, pollutant type and volume. Duration of discharge. Location. Emulsification rate.	Maps, weathering curves, tables, spill reports.	24 hours Cedre
	G.E.A.	Channel & Atlantic, North of 43°	Special programme	No	Vectorial addition of current and wind.	1 to 72 hours	Influence of current and wind.	Maps	24 hours French Navy Premar/Com
	OSIS	Channel & North Sea	Windows	Inter-changeable	Particle based (lagrangian model).	1 to 72 hours	Current, wind, location, pollutant type and volume. Duration of discharge.	Maps, weathering curves spreadsheets, spill reports	24 hours Cedre
	MOTHY, (under development)	World Wide		Arcinfo GIS	Atmospheric forecast provided by wind and sea-level pressure forecast from European Met. Office. Tide forcing including Channel	5 days with five-hours interval	Location. Pollutant type and volume. Duration of discharge.	Maps	24 hours Météo France Cedre.

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					& Bay of Biscay.				
Germany	BSHdmod	Regional	Special programme	N/A.	Using stored and updated tidal current and wind data calculated in a hydrodynamic model. Particles are transported as a result of advection by tidal currents and turbulent diffusion, simulated by a Monte Carlo method. Account is taken of main physical processes.	Past and 36 hours in the future. It can be used in the back-tracking mode to trace the originator of a spill.	Date, time and position, amount, type of substance, continuous or spontaneous release.	Maps	24 hours
Ireland	Oilmap Chemmap	Irish Pollution Responsibility Zone	*	Yes, GIS is based on MapInfo MapX	Vectorial addition of current and wind and characteristics of oil in relation to behaviour	Depending in input data	Date, time, position, location, type and amount of pollution	Maps, mass on water, shoreline impact	24/7 (ASA Product)
<p>* The OILMAP model comprises several integrated components. The spill model itself predicts the movement of oil on the water surface and the distribution of oil in the environment (evaporated, in the water column, on the shoreline). For these calculations the spill model relies on environmental data such as wind and currents, physical data such as the proximity of shorelines, and the chemical data that defines the type of oil. Each of these types of data can be input and edited using the appropriate OILMAP component.</p> <p>Spill models available:</p> <p>The basic model is the <b>trajectory and fates model</b> which tracks the oil's movement on the water surface and determines the amount evaporated, dispersed into the water column, and stranded on the shoreline over time.</p> <p><b>Subsurface model</b> follows the oil's movement both on the water surface and in the water column.</p> <p><b>Stochastic model</b> performs a large number of oil trajectory simulations using different wind conditions.</p> <p><b>Receptor model</b> is essentially the stochastic model run in reverse.</p>									
The Netherlands	SIMAP/OILMAP	Worldwide	Windows environment	Yes	Generic theory on wind and current impact and characteristics of oil in relation to the behaviour.	Depending on input data.	Date, time, position. Location. Type and amount of pollutant.	Maps, mass on water, shore sediment.	24 hours, (ASA product)
Norway, 1	Oil Weathering model	Area dependent	Special programme	N/A	Based on detailed laboratory weathering studies of each particular oil. Spreading, evaporation, natural dispersion, emulsification, pour point, flash point, emulsion stability, mass balance.	Hours to weeks	Laboratory weathering data, wind, temperature, slick thickness, rate	Graphics, text	
Norway 2	Oil Spill	Worldwide	Windows	Yes	Oil Weathering, mass balance,	Minutes to years	Oil types, release	.	

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	Contingency and Response (OSCAR) model ***				spill trajectory, strategic response. Incorporates the SINTEF OIL Weathering MODEL (OWM) and Deep Blow models. Strategic analysis of alternate oil spill response. Net environmental benefit analysis (NEBA). Natural resource damage assessment (NRDA), Environmental Impact Factor (EIF) analysis		specifications (rates, surface vs subsurface, multiple sources etc) winds, currents, bathymetry, coastline (from supplied worldwide databases.		
<p>*** <b>OSCAR, DREAM and ParTrack</b> comprise a state-of-the-art 3-dimensional suite of oil spill and chemical release models that resolves releases with up to 200 separate chemical components or component groups, including degradation products. This allows for detailed and realistic environmental impact and risk analysis. Integrated capabilities include:</p> <ul style="list-style-type: none"> <li>• Laboratory-and field-calibrated oil weathering based on an international standard established by SINTEF</li> <li>• 3-dimensional dynamic simulation and visualization of surface, subsurface, and coastal pollutant distributions and concentrations</li> <li>• Advanced gas and oil blowout simulation from deep and shallow waters</li> <li>• Stochastic environmental risk and net environmental benefit analysis (NEBA)</li> <li>• Natural resource damage assessment (NRDA)</li> <li>• Detailed analysis of alternate spill response strategies for oil spill contingency and response</li> <li>• Environmental Impact Factor (EIF) analysis for oil spills and operational releases such as produced water, drill muds and cuttings</li> <li>• Exposure of organisms, and dynamic body burden calculations</li> </ul>									
Norway	Deep Blow	Area independent	Special programme	No	Lagrangian buoyant jet/plume model simulating sub-sea blowouts from oil wells. Compute dilution of a plume formed from a sub-sea blowout with oil and gas in stratified water masses. Includes potential hydrate formation. Behaviour of plume at sea surface, including oil slick formation. Integrated into OSCAR oil spill contingency and response model.	Seconds to days	Spill rate and water depth. Sea temperature and salinity.	Underwater plume. Dilution, concentration. Spreading at surface. Size and thickness of slick	
	ShipDrift (statistical ship drift model)	World Wide	Fortran	Yes	Drift time, influence area	Adjustable	Wind and current, ship specifications	Ship drift trajectories	On demand

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	OilTraj  (statistical oil drift model)	World Wide	Fortran	Yes	Oil mass balance, drift time, influence area	Adjustable	Wind and Current, Oil weathering properties	Oil spill spreading (surface, subsurface, stranding)	On demand
	ActLog (Operational Oil Spill Response and planning toolkit)	World Wide	ArcView ArcIMS	Yes	Response time, Met-Ocean conditions, Vulnerable areas, Shoreline impact	N/A	Accidental event	Maps, GIS event tracker, Web interface	On demand
Sweden	Seatrack Web	The Baltic Sea and westwards to longitude 6E	Windows and Java Web start	Yes	Current from HIROMOB model, wind from Hirlam weather model	Forecasts two days ahead and hindcasts 10 days in the past.	Date, time, position, discharge.	Maps	24 hours SCG HQ SMHI
United Kingdom	OSIS VMIS	UK waters and North Sea	Windows	Yes	Vectorial wind and tide oil and chemical type, volume. Input wind speed and direction, temperature, fore and hind cast modelling.	Adjustable	Date, time, position, weather and oil type. Evaporation, dispersion, emulsification, drift.	GIS display of oil/chemical trajectory over time. Predicted evaporation, emulsification dispersion. Likely effectiveness of dispersants in time frame. For oils and chemicals.	24 hours

**CHEMICALS**

Contracting Party	Name of tool	Applicable area	Specific type of software	GIS related	Calculation parameter(s)	Time horizon	Input	Output	Availability
Germany	RESY-B	Worldwide	DOS	No	None Oil and Chemical Database	N/A	UN-number, Name CAS-number or Fragments	Text	24 hours German language
The Netherlands	SIMAP/ Chemical M (USA)	Worldwide	Windows	Yes					24 hours
The Netherlands	SISTER	-	Special database	No	Database containing over 2000 chemicals frequently transported to Rotterdam.	N/A	UN-number, Name CAS-number	Hazardous profile. Applicable Dräger tubes.	
Norway	MigMod	Worldwide		Yes	Movement of marine organisms within a given population, biological exposure and uptake of pollutants.	Days to years	Behaviour and population parameters. Output from oil or chemical spill model.	Distribution of exposures and effects.	Sintef
	DREAM and Par Track ***	Worldwide	Windows, dynamic map-based simulation tools for operational and accidental discharges of complex mixtures of chemicals, drill muds and cuttings	Yes	Mass balance, 3-dimensional fates and effects of complex mixtures of chemicals, including oils, Net environmental benefit analysis (NEBA). Natural resource damage assessment (NRDA). Environmental Impact Factor (EIF) analysis	Minutes to years	Chemical profile of release (up to 200 chemical components), release specifications (rates, surface vs subsurface, multiple sources, etc), winds, currents, bathymetry, coastline (from supplied worldwide databases	3D dynamic maps, natural resource exposures, risk assessment maps.	
*** See page 3/6									
UK	VMIS CHEMSIS	UK waters	Windows	Yes	Chem database floater, sinker, evaporator, dissolver co- efficients. Vectorial wind tide.	Hours to months	Chem species wind speed/direction, date, time, position, temperature.	Evaporate, dissolve, sink, percentage geographical track.	24/7

**Floating objects**

Contracting Party	Name of tool	Applicable area	Specific type of software	GIS related	Calculation parameter(s)	Time horizon	Input	Output	Availability
France	Conteneurs	Worldwide		cf. MOTHY (p. 1/5)	cf. MOTHY (p. 1/5)	cf. MOTHY (p. 1/5)	Location rate of immersion (10% to 90%).	Maps	24 hrs Météo France contact Cedre.
Germany	BShd mod	Regional	Special programme	No	Using stored and updated tidal current and wind data calculated in a hydrodynamic model. Particles are transported as a result of effectuation by tidal currents and turbulent diffusion, simulated by a Monte Carlo method. Account is taken to main physical processes.	Past and 36 hours in the future It can be used in the back-tracking mode.	Date, time, position, proportion above/under sea surface.	Maps	24 hrs
The Netherlands	SIMAP	Worldwide	Windows	Yes	Depending on object.	Adjustable	Wind and current. Position. Proportion above/under sea surface.	Maps	24 hrs
UK	SARIS	UK Sea Area	Windows VMIS	Yes	UKHO tidal atlas with wind vectorial	Hours/days	Position, date, time	Trajectory	24/7

**Gas clouds**

Contracting Party	Name of tool	Applicable area	Specific type of software	GIS Related	Calculation parameter(s)	Time horizon	Input	Output	Availability
France	EPI	Area Independent	Special programme	No	Simulation model of dispersion of gas or evaporating chemicals in atmosphere.		Chemicals discharge. Wind.	Maps Tables	24 hours Cedre
Germany	DEGADIS	Worldwide	Special programme	N/A	Simulates a variety of dense or neutrally buoyant releases from point or area sources, including steady-state releases and prescribed time -varying (transient) releases. Accounts for the three regions of dispersion and for the effects due to energy exchange between dispersion cloud and the underlying surface.	Dynamically until stationary condition.	Meteorological data, chemical and physical data of the substance, amount, surface roughness.	Maps	24 hours
The Netherlands		Netherlands Continental Shelf only						Maps. Prediction of behaviour. Hazard profile.	Contract with semi-commercial company.